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Metals Review

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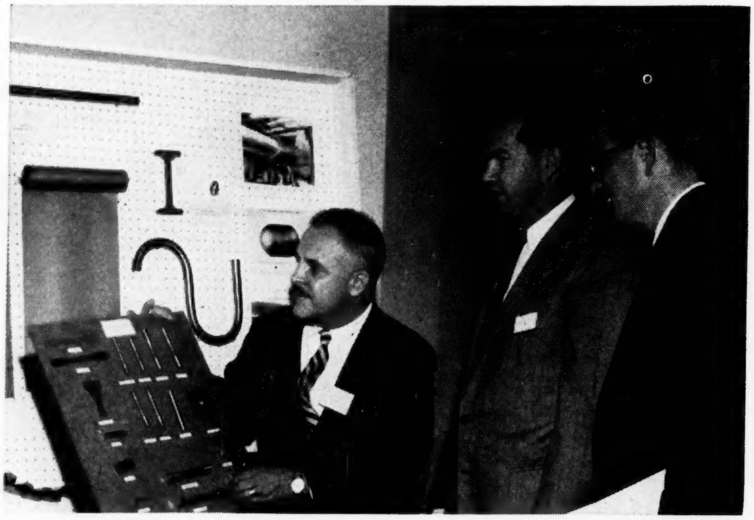

Present at the Symposium on "Titanium" Held at New York University in Conjunction with A.S.M., Were, From Left: John Nielsen, Head of the N.Y.U. Metallurgical Engineering Department; Anton deS. Brasunas, Director of Metals Engineering Institute; and Harold Margolin, Symposium Chairman

Close to 150 persons attended the highly successful launching of the A.S.M.'s Metals Engineering Institute last month when it cooperated with New York University in sponsoring a five-day symposium on "Titanium". Twenty five lectures and three evening discussion periods provided the registrants with ample opportunity to accumulate valuable technical information. Registrations came in from more than half of the 48 states, from Canada and from England. Over 100 had to be turned away for lack of space.

The meeting, the first of its kind to be held, was conceived by John Nielsen, head of the metallurgical engineering department of New York University. He had contacted the American Society for Metals and learned that much titanium data was being gathered by Walter Finlay, Rem-Cru Titanium Corp., for one of the 40 courses being organized for the Society's new Metals Engineering Institute. The cooperation of these two organizations seemed logical and proved to be very fruitful.

Technical sessions were held at the new auditorium at N. Y. U. and registrants had the opportunity of christening the new men's dormitory, Loew's Hall, which will soon be dedicated. The quiet atmosphere of the University Heights campus provided a suitable background to the highly technical discussions on the making and shaping of the newest engineering metal, titanium.

W. J. Kroll, known to many at the "father of modern titanium" was a featured speaker. He outlined the latest trends in titanium recovery and cited the importance of ilmenite ores which are currently being studied by Canadian industries.

Although aircraft manufacturers are not completely satisfied with the status of titanium alloy development, its place in aircraft is assured, at least in certain noncritical areas. Metallurgical engineers are hard at work developing new and better alloys which will make titanium a fully reliable construction metal, thereby making possible the construction of aircraft having remarkable performance characteristics.

If high interest in titanium is maintained, the A.S.M. Metals Engineering Institute will probably consider repeating such a conference in the future.

Talks on Steel Quality For Seamless Tubing At Northern Ontario

Speaker: Ralph W. Farley

Republic Steel Corp.

Ralph W. Farley, director of process development, Republic Steel Corp., discussed "General Aspects of Steel Quality", at a meeting of the **Northern Ontario Chapter.**

Mr. Farley discussed the ever-increasing demand for higher quality imposed by more exacting customer requirements, making it necessary for the steel industry to strive for improved production techniques, new methods of testing and more rigid inspection.

He enumerated the four principal factors stressed by industry in their progress toward higher product quality: Critical examination of each factor making up the entire process; education of personnel; improved job training; and development of quality-consciousness on the part of the individual.

Basically, steel for the production of seamless tubing must be of good forging quality. That is, it must be homogeneous and free from porosity and surface defects. Certain fully killed steels, including deoxidized Bessemer grades, must be used for successful seamless pipe manufacture. Hot-top ingots are desirable from the standpoint of quality and bloom to finished pipe yield. Oxidation of the pipe cavity becomes a serious problem in open-top molds, resulting in ragged piercing, and is minimized by water chilling the tops to form a solid shell.

Both surface and internal conditions of the billet are reflected in the quality of the finished pipe. Generally, the location of a steel defect in the finished pipe can be related to a corresponding position in the billet.

Mr. Farley discussed some of the common pipe defects which have their origin in steel quality. Laps are the most commonly occurring outside wall defects, and one of the most troublesome. When a lap occurs on the inside wall it generally becomes a "tear" under the action of tangential shear. Also emphasized were the effects of ferrite "fingers" and nonmetallic inclusion stringers.

In closing, the speaker reiterated his earlier comment that, in order to correct pipe defects arising from the condition of the steel, close attention must be given to every factor in the entire steelmaking process which effects steel quality—**Reported by J. L. Venier for Northern Ontario.**

To Hold Symposium in India

A Symposium on "Production, Properties and Applications of Alloy and Special Steels" will be held by the National Metallurgical Laboratory, India, from Feb. 1 through 3, 1956. The Symposium's objectives are to draw attention to the usefulness of stepping up the alloy and steel industry along scientific lines, to indicate to engineering industries the need to rationalize the demands and fall in with the specifications of alloy steels which can be made from Indian raw materials, to define satisfactory grades of alloy steels from Indian sources and to discuss special equipment and practice required in steel works for producing these steels and the materials involved in their production.

Invitations are being extended to technologists and scientists from the United States to contribute technical papers for the Symposium. Equipment for the projection of slides and drawings will be available. Further information may be obtained by writing: E. H. Bucknall, Director, National Metallurgical Laboratory, Jamshedpur 7, India.

Visiting Lecturer Granted Degree

Samuel L. Hoyt, the 1955 A.S.M. Visiting Lecturer, Received a Doctor of Science Degree From the South Dakota School of Mines School of Engineering During His Visit. Dr. Hoyt, technical adviser at Battelle Memorial Institute, lectured on "Industry's Need for Metallurgists". He also participated in the presentation of a $400 A.S.M. scholarship to Sherrill G. Swenson. Shown are, front: Dr. Hoyt; to his left: Paul Anderson, head, metallurgy department; to Dr. Hoyt's right: F. L. Partlo

ASM Visiting Lectureship Program Continues to Grow

The A.S.M. Annual Visiting Lectureship Program continues to draw more and more attention and commendation, as leading schools realize the value of individual participation. The Society has completed three annual Programs, in which a total of 31 eminent scientists and engineers have been sent on a visiting lectureship to as many schools.

The society receives requests for individual lecturers from the dean or department head of the school and in turn invites that individual to conduct a two-day special lectureship on a date mutually agreed upon. A.S.M. underwrites the cost of such lecturships, except for a token contribution from each school.

The following is a list of the lecturers, the lecture subject and the school to which they made their visit during 1954-55:

R. Schuhmann—Thermo and Kinetic Studies—Missouri School of Mines; H. J. Roast—Nonferrous Casting—Laval University; C. S. Smith—Metallurgy in Ancient Times—Johns Hopkins University; B. L. Averbach—Diffuse X-Ray Scattering—Illinois Institute of Technology; J. O. Almen—Fatigue in Metals—University of Wisconsin; H. Eyring—Kinetics—University of British Columbia; F. D. Cullity—X-Ray Diffraction—McGill University; M. Cohen—Hardening and Tempering of Steel—University of Cincinnati; George Sachs—Plasticity—Notre Dame; C. S. Smith—Segregation—University of Toronto; S. L. Hoyt—Metals Industry Development—South Dakota School of Mines; and R. Gomer—Emission Microscope—New York University.

The first annual program (1952-53) covered eight visiting lectureships, the second (1953-54) program included lectureships in both the United States and Canada.

Details Statistics of Metalworking Industry

Speaker: Walter J. Campbell
Steel Magazine

Walter J. Campbell, managing editor of *Steel* magazine, presented an illustrated discussion entitled "Let's Grow With Metalworking" at a meeting of the **Georgia Chapter.**

The increasing population is requiring more and more products from the metal worker. At the present, the industry has a volume of some 125 billion dollars. By 1975, some 200 million people should have need of 338 billions of dollars of metal products. As we look further into the future, the figures become even more fantastic, an estimated 800 million dollars by the year 2000. The steel industry alone is looking to 200 million tons of steel by 1975.

Mr. Campbell pointed out that in 1953, the 125-billion dollar metalworking gross was twice as much as any other industry. It approximated about one-third the total business and services.

During the meeting a watch and silver service tray was presented to John T. Butler, immediate past chairman of the Chapter. Carl B. Cramblett, LeTourneau-Westinghouse Co., accepted a certificate of recognition as a sustaining member of A.S.M. and gave a short talk on his company and its products.—**Reported by James W. Johnson for Georgia.**

IMPORTANT MEETINGS *for November*

Nov. 1-3—Investment Casting Institute. Annual Fall Meeting, Sheraton-Cadillac Hotel, Detroit. (Peter Schipper, Director, I.C.I., 27 East Monroe St., Chicago 3)

Nov. 8-10—Central Manufacturing District. Pageant of Industrial Progress, International Amphitheater, Chicago. (J. Walter Thompson Co., 410 North Michigan Ave., Chicago 11)

Nov. 8-11—American Council of Independent Laboratories. Annual Meeting, Westward Ho Hotel, Phoenix, Ariz. (A.C.I.L., 4302 East-West Highway, Washington 14, D. C.)

Nov. 9-11—Industrial Management Society. Time and Motion Study and Management Clinic, Hotel Sherman, Chicago. (L. M. Glassner, Vice-President, Public Relations, I.M.S., 35 East Wacker Drive, Chicago 1)

Nov. 13-18—American Society of Mechanical Engineers. Fifth National Meeting, Chicago. (Ernest Hartford, Executive Assistant Secretary, A.S.M.E., 29 West 39 St., New York 18)

Nov. 14-17—Wire Association. Annual Convention, La Salle Hotel, Chicago. (Richard E. Brown, Secretary, W.A., 453 Main St., Stamford, Conn.)

Nov. 14-17—Second International Automation Exposition, Navy Pier, Chicago. (Richard Rimbach Associates, Management, 845 Ridge Ave., Pittsburgh 12)

Nov. 16-18—Society for Experimental Stress Analysis. Annual Meeting, Hotel Sheraton, Chicago. (W. M. Murray, Secretary, S.E.S.A., P.O. Box 168, Cambridge 39, Mass.)

Nov. 27-30—American Institute of Chemical Engineers. Annual Meeting, Statler Hotel, Detroit. (S. L. Tyler, Executive Secretary, A.I.C.E., 25 West 45 St., New York 36)

Hard Facing Alloys Described

R. P. Culbertson, Head of the Process Development Department, Haynes Stellite Co., Discussed "Alloy Hard Facing" at a Meeting of Chattanooga Chapter. Present were, from left: Walter A. Neisz, chairman; H. B. Brooks, sustaining member, Brooks Welding Supply Co.; and Mr. Culbertson

Speaker: R. P. Culbertson

Haynes Stellite Co.

The **Chattanooga Chapter** opened its 1955-56 season with a talk on "Alloy Hard Facing" by R. P. Culbertson, head of the process development department, Haynes Stellite Co.

Mr. Culbertson traced the history of hard facing back to England to about 1896. The oil industry, with its need for long-wearing drill bits, gave hard facing one of its early uses in this country, followed by the motor industry's use of hard surfaced internal combustion engine valves. Railroads began to build up crossing rails with hard facing materials about 1933, and since 1930, industry has made wide use of hard facing in production and maintenance.

Hard facing materials were originally deposited by the oxy-acetylene method, which is still the best method for giving a hard surface of little base metal dilution and freedom from imperfections. Electric arc and submerged arc methods are used, but dilution and heat distribution are more difficult to control than in oxy-acetylene methods.

Mr. Culbertson explained that hard facing materials come in many forms, including gas and coated electric arc rods, tubular rods with the material in metal tubes used as electrodes, inserts, filler bars, powders to be sprayed on, pastes and fluxes for submerged arc welding.

The selection of a hard facing alloy depends on the abrasion, impact, corrosion and galling needs of the finished piece.

Mr. Culbertson described the hard facing alloys consisting of carbides of various metals, such as chromium and tungsten in a soft matrix. The alloys are classified as to alloy content when ferrous, nonferrous, such as cobalt, nickel and copper, and the carbide or "diamond substitutes" such as tungsten carbide.

Mr. Culbertson illustrated examples of hard facing methods and products with slides—**Reported by J. H. McMinn for Chattanooga Chapter.**

Improving Production From Tools and Dies

Speaker: J. Y. Riedel

Bethlehem Steel Corp.

At the first technical meeting of the current season, the **Northeast Pennsylvania Chapter** heard J. Y. Riedel, tool steel engineer for the Bethlehem Steel Corp., deliver a talk on "Improving Production From Tools and Dies."

Throughout industry there is an average annual increase in productivity of 3% with existing equipment. This increase comes about as a result of better tool and die education, which involves a knowledge of proper design, proper selection of steel, proper heat treatment, proper grinding, and proper use of tools.

J. Y. Riedel

These five factors are linked as a chain, and all links must be equally strong if good tool life is to be realized. Mr. Riedel elaborated on these factors and pointed out some of the pitfalls to be avoided in each category.

Inadequate or improper design may cause failure during heat treatment or early in service. Good design often is difficult because the calculation of stresses in the tool may be impossible. As a result, tool design sometimes is based largely on past experience, which points out the pitfalls to be avoided. Improper design features include sharp internal corners, sudden changes in section size, blind holes, square keyways and undersized radii. The speaker pointed out means of avoiding these features or of mitigating their effects. Prestressing the surface, such as by shot peening or cold drawing, is a commonly employed stress-lowering practice. Unloading notches placed near stress raisers lessen severity.

Proper selection of toolsteels has been made simple by the large amount of published information available and by the standardization brought about by the S.A.E. and A.I.S.I. in the last ten years.

The performance of many tools and dies is improved by such surface hardening processess as carburizing and nitriding, which may increase wear resistance. Redressed tools of shallow-hardening steels may be rehardened to give maximum service.

The grinding operation produces a burr or feather edge on tools which should be removed by honing or other means. The direction of the final grinding scratches should be parallel to the direction of movement of metal over the tool surface. Because grinding always leaves residual tensile stresses on the tool surface, elimination of the operation may serve to extend tool life.

Improper use of tools is one of the major reasons for poor tool life. As an example, the speaker pointed out that with punches it may not be necessary to go completely through the blanking material. A controlled stroke would save wear on the punch, as would proper clearance between punch and die.

The speaker concluded his talk by showing and discussing a series of slides depicting some of the approved and some of the unsatisfactory practices in tool design.—**Reported by A. J. Babecki for Northeast Pennsylvania Chapter.**

Birmingham Opens Season With Talk on Titanium

Speaker: T. W. Lippert

Titanium Metals Corp. of America

The first meeting of the season of the **Birmingham Chapter** featured a talk on the "Production and Application of Titanium" by T. W. Lippert, manager, sales and technical service of the Titanium Metals Corp. of America.

The method of winning titanium from its ore was described and compared in general to other methods which are either in use or contemplated. A short film was shown in which the early development of vacuum melting, as well as rolling techniques involving the production of coiled titanium sheet, was illustrated.

Following the film, the use of alloying elements and their effect on physical properties was discussed. During this discussion it was brought out that aluminum is the most promising of the alloying elements at this time since it not only imparts the desirable strength and ductility but improves the strength-to-weight ratio, making it more competitive with relatively common metals it is replacing.—**Reported by Donald C. Bertossa for Birmingham.**

Wins Pittsburgh Golf Trophy

At the Annual Summer Jamboree of the Pittsburgh Chapter, Edward Lipski (Left) Won the Golf Trophy for One Year. He is shown receiving it from Norman Tisdale, Jr., last year's winner and member of the entertainment committee. Other activities included volley ball, horseshoes, putting, card games, beer and dinner. (Reported by H. F. Turnbull for Pittsburgh)

Discusses High-Temperature Alloys

E. N. Skinner, International Nickel Co., Who Spoke on "Alloys for High-Temperature Service" at a Meeting of the Indianapolis Chapter, Is Shown Discussing His Talk With Members During a Question and Answer Session

Speaker: E. N. Skinner
International Nickel Co.

Members of the **Indianapolis Chapter** heard a talk on "Alloys for High-Temperature Service" by E. N. Skinner of the International Nickel Co.

The problem of material selection for application at elevated temperatures is a complex one. Dr. Skinner stressed that such factors as material cost, availability and engineering are to be considered before any selection of a material is made for high-temperature service. Other factors of major importance are physical properties such as melting point, density, thermal conductivity, electrical resistivity, specific heat, thermal expansion and the stability of the structure to alteration at elevated temperatures. The stability of the structure at an elevated temperature is the most important physical property to be considered. He cited the formation of graphite from iron carbon in high pressure steam service as an example. Such a formation, with the accompanying formation of sigma, will lead to a sharp reduction of ductility.

Such mechanical properties as strength, ductility, hardness, fatigue, notch sensitivity and creep are important items to be considered before material selection. Dr. Skinner emphasized that the principal yardstick of high-temperature application is creep, the plastic deformation under load.

Creep normally occurs in three stages: At first, strain is quite rapid in relation to time, then there is a long period in which the rate of increase in strain is low in relation to time, finally the rate of strain increases rapidly and failure occurs soon thereafter. Creep will give an indication of the ductility of the material before it fails. Dr. Skinner cautioned, however, that creep and rupture are not inter-related.

Dr. Skinner stated that all of the strength in the world will not make a metal last in high-temperature service unless it possesses good chemical properties. He stressed that the material must be able to form an oxide film on the surface of the material to provide some degree of protection from gaseous or other harmful corrosive atmospheres. The oxide film breakdown depends upon stress. It is actually a laterally compressed spring. If adhesion is good and cohesion poor, blistering or shear cracking may result, thereby destroying the oxide film and re-exposing the material to the corrosive environment. An example of a material capable of forming such an oxide film is Inconel. This nickel alloy, containing 75% Ni, 15% Cr and 7% Fe, is a nonmagnetic alloy which is resistant to oxidation at elevated temperatures and to oxidizing conditions in corrosive environments. Because the oxide formed on Inconel at elevated temperatures is tightly adherent it finds wide application in many types of furnace and heat treating equipment and in aircraft engines. He stated that many gaseous environments containing sulphur will completely embrittle certain nickel alloys. Such alloys may be made resistant to attack by sulphur compounds at elevated temperatures by the addition of larger amounts of manganese.

Dr. Skinner concluded that the corrosive resistant barrier as provided by the oxide film on the surface of a material to be used for high-temperature application is an important criterion for material selection.

An interesting question and answer period followed the discussion—**Reported by Robert F. Fesko for Indianapolis Chapter.**

Rocket Materials Topic at Los Alamos

Leonard D. Jaffe, Jet Propulsion Laboratory, Addressed the Los Alamos Chapter on the "Jet Propulsion Laboratory and Rocket Materials". From left are: Dr. Jaffe, Robert T. Phelps, chairman, and Daniel J. Murphy, program chairman. (Photograph by Clayton O. Matthews for Los Alamos)

Speaker: Leonard D. Jaffe
Jet Propulsion Laboratory

Leonard D. Jaffe, chief of the materials section of the Jet Propulsion Laboratory, addressed the Los Alamos Chapter at the first meeting of this season, on the "Jet Propulsion Laboratory and Rocket Materials".

He explained that the Jet Propulsion Laboratory is operated by the California Institute of Technology for agencies of the Department of Defense in the field of rocket design and development. Work on rockets started at Cal Tech in 1936 under Von Karman and the Laboratory was established on its present site in Pasadena during World War II. From its early accomplishment in developing the first successful solid and liquid Jatos, work turned to the WAC Corporal, whose altitude record of 250 miles still stands, and the Corporal, the first U. S. tactical long-range rocket missile, now in the hands of troops. Present development takes in other missiles and missile systems, air frames, propulsion, hydraulics, trajectories, guidance and ground equipment. Supporting research is concerned with supersonic aerodynamics, boundary layers, effects of turbulence, air-fuel combustion, electronics, microwave and information theory, mathematics and computing, chemical engineering, thermodynamics, heat transfer, combustion, and the ever-present problem of materials, intensified in this high-temperature field.

Dr. Jaffe concentrated his talk on the requirements which are placed on materials throughout the design of a typical rocket. He stressed the need for lightness, toughness and good storage life, and pointed up the very special circumstances which prevail in the employment of materials in rockets—though they must endure very high temperatures and erosion rates, their service life is very short, being but a matter of minutes or even seconds. If the design permits cooling by fuel circulation of parts and surfaces subjected to high temperature, then the materials problem centers on matters of heat conductivity, weldability, short-time resistance to fuel flow and pressure, and structural life. Mild steel, aluminum or stainless steel are generally applicable in these circumstances. If, however, cooling is difficult or impossible, then materials need a high softening temperature, and strength, toughness and resistance to erosion at high temperature. Under these conditions, ceramics, such as carbon or silicon carbide, cermets or high-melting metals, such as molybdenum or tungsten, are applicable, though the high density of the latter introduces a weight problem.

The many and varied applications of materials throughout the rocket structure create a wide assortment of problems, all intensified by high temperature and erosive environment. There are the guide vanes, often located in the stream of exhaust gases. These are uncooled but need not hold their dimensions, and any material which will hold up for a very brief time will suffice. The tail cones run somewhat cooler but contribute to rocket performance for a longer period; steel, chromium or cobalt base alloys or titanium are applicable. The skin components tend to heat up rapidly in the air stream and they must be able to dissipate this heat since flight times are short. Thickness is important and aluminum is applicable here, as are insulating coatings. The internal structural parts require the usual high strength-weight ratio, and magnesium, aluminum, titanium and steel are used, as in air frame construction. Fuel tanks, plumbing, electronic and guidance systems, and auxiliary power equipment pose the usual materials problems, but again, in the special environment of a rocket in flight, are called upon to function under circumstances which are extreme in nature, though for a very short time.—**Reported by D. J. Murphy for Los Alamos Chapter.**

Schedule Library Conference

The American Society for Metals has accepted an invitation to act as one of the co-sponsors of a "Conference on Practical Utilization of Recorded Knowledge". The conference is being organized by the School of Library Science and its Center for Documentation and Communication Research at Western Reserve University. It will be held in Cleveland on Jan. 15 through 18, 1956, on the occasion of the dedication of the new university library.

One purpose of the conference is to discuss problems facing scientists and librarians today in the processing, dissemination and utilization of the constantly increasing volume of recorded information. Specific discussions will cover the fields of metals, chemistry, military decisions, patents, physics and many others.

Further information about the conference may be secured from Dean Jesse H. Shera, School of Library Science, Western Reserve University, Cleveland 6, Ohio.

Compliments

To FRANCIS C. FRARY, former director of research, Aluminum Co. of America, on being awarded the Guido Donegani Gold Medal by the Assoiazone Italiani di Metallurgia for his contributions to the development of scientific knowledge on aluminum and to the improvement of metallurgical and technological knowledge.

Dr. Frary, who holds the A.S.M. Gold Medal, organized Alcoa's Aluminum Research Laboratories. He joined the company in 1918 and retired as active director of research in 1952.

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To ROBERT S. LYNCH on being elected chairman of the board of the Continental Gin Co. Mr. Lynch, who is president of the Atlantic Steel Co., is a past chairman of the Georgia Chapter.

Announce Schools in ASM Foundation Scholarships

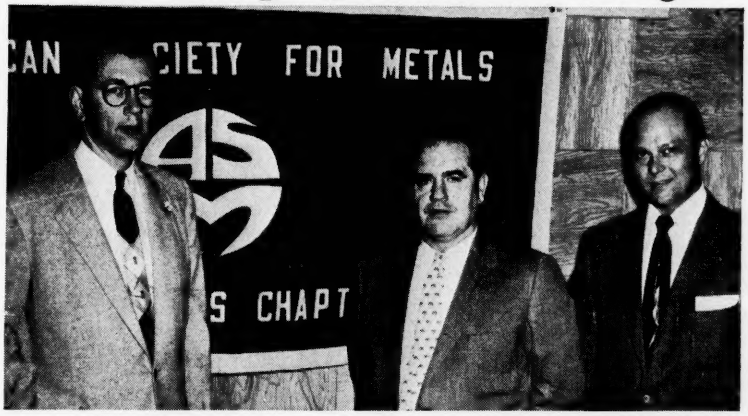
The A.S.M. Foundation for Education and Research has completed the third year in its sponsorship of scholarships for metallurgy students.

The first year of the Foundation's scholarships included 51 schools in Canada and the United States. Because certain of these schools were not included in the second year program, the total number of schools through which scholarships were given was 49.

The complete list of universities included in the 1955-56 A.S.M. Foundation's $400 scholarships are:

Universities of Alabama, Arizona, British Columbia and California, Carnegie Institute of Technology, Case Institute of Technology, University of Cincinnati, Colorado School of Mines, Columbia University, Cornell University, Drexel Institute, Illinois Institute of Technology, University of Kansas, University of Kentucky, Lafayette, Laval, Lehigh, Massachusetts Institute of Technology, McGill, Michigan College of Mines, Michigan State, University of Michigan, University of Minnesota, Missouri School of Mines, University of Illinois, Montana School of Mines, New York University, Notre Dame University, Nova Scotia Technical Institute, Ohio State University, University of Pennsylvania, Penn State, University of Pittsburgh, Brooklyn Polytechnic Institute, Purdue University, Queen's University, Rensselaer Polytechnic Institute, South Dakota School of Mines, Stanford University, Tennessee, Texas Western, Toronto, Utah, Virginia Polytechnic Institute, Washington State, Washington University, Wayne, Wisconsin, and Yale.

Points Out Specifications Not Enough



R. E. VanDeventer (Center), Alloy Engineering and Casting Co., Who Gave a Talk Entitled "Specifications Are Not Enough" at a Meeting in Los Angeles, Is Shown With S. R. Kallenbaugh (Left) and Alexander Gaul

Speaker: Ralph E. Van Deventer
Alloy Engineering & Casting Co.

The inadequacy of specifications for controlling the properties of engineering parts was the subject of a talk, "Specifications Are Not Enough", given by Ralph E. Van Deventer, vice-president of the Alloy Engineering and Casting Co., at a meeting of the **Los Angeles Chapter.** Mr. Van Deventer summarized the results of his many years of experience in different industries in taking the necessary actions to produce acceptable parts.

Mr. Van Deventer emphasized that testing of a final product or a raw material for routine compliance with a specification is exceedingly poor assurance of a good part or a good material. Much more important is the process control that goes into the manufacture of the part or material. This process control must be tailor-made to fit a material for a particular application, rather than to fit it to pass a routine specification.

The speaker listed and discussed a number of factors which are important in determining the functions of a part which cannot be controlled by specification. Among these were the fatigue strength of the material or part and the factors which determine what this fatigue strength will be, including residual stress, the absence or presence of plating, the heat treating and case hardening cycles which may be employed, forming operations and other processes which influence residual stress distribution. Internal dampening is another feature which cannot be controlled by the specification but may be an all-determining factor in the life of the part.—**Reported by J. L. Waisman for Los Angeles Chapter.**

Completes Third Program Of Vocational Training

The American Society for Metals has just completed its third annual Program of Vocational Teacher Training. This program operates to give added preparation to vocational teachers whose classroom work covers such trades as welding, machining, drafting and others involving the use or handling of metals.

Each year since the beginning of the program, state vocational administrations have accepted and cooperated in training their teachers in the field of metals technology. The Society's purpose and the vocational administrations' purpose is to provide a means of up-grading the vocational student in the skilled trades. With a working knowledge of metal's technology, students will be better qualified to carry on their work and less subject to supervision by engineers.

In the training of vocational teachers, A.S.M. is endeavoring to increase engineering personnel through the creation of better technicians, more efficient foremen and men more adaptable to the job of being an associate or assistant engineer.

During the early months of 1955, A.S.M. began an intensified program to win the interest and cooperation of our many technical institutes. The effort is beginning to bear fruit and it is expected that arrangements will be completed before the first of next year for teacher training sessions covering the trade instructors in technical institutes.

There are approximately 65 technical institutes in the United States. Each of these schools will be invited to send their trade teachers to a central point (probably a centrally located technical institute) for special teacher training sessions, organized and conducted by A.S.M.

In each teacher training session, A.S.M. provides the best teacher obtainable, who conducts a program created by the Society's Committee on Vocational Education.

Student classroom texts will be made available through a special arrangement with the New York Board of Education, which is soon to release texts in book form of material prepared as the result of New York State's first participation in this teacher training program in 1953.

One or more summer sessions for the training of vocational teachers under the A.S.M. Program have already been held in Massachusetts, Connecticut, New York, Pennsylvania, Michigan, Indiana, Illinois and Kansas.

presents an annual metallographic exhibit during the National Metal Exposition and gives awards for the best work.

Additions to 1955 Preprint List

These papers have been preprinted for the purpose of stimulating discussion of them and will appear in the next volume of Transactions which will be published early next year.

The following papers have been preprinted and are available to members of the American Society for Metals upon request. These papers have been preprinted for the purpose of stimulating discussion of them and will appear in Volume 48 of the Transactions which will be published in 1956.

40. **Zirconium-Germanium Alloy System,** by O. N. Carlson, P. E. Armstrong and H. A. Wilhelm, Institute for Atomic Research and Department of Chemistry, Iowa State College, Ames, Iowa.

41. **Room and Elevated-Temperature Mechanical Properties of AISI Type-414 and Type-431 Stainless Steel,** by E. J. Dulis, S. J. Parker and P. W. Marshall, United States Steel Corp., Applied Research Laboratory, Monroeville, Pa.

42. **Approximate Phase Relationships in the Titanium-Vanadium-Aluminum System at 1800° F. and at 1400° F.,** by Charles B. Jordan and Pol Duwez, California Institute of Technology, Pasadena, Calif.

43. **Fabrication and Evaluation of Thin Clad Sheets of Molybdenum,** by M. H. LaChance and R. I. Jaffee, Battelle Memorial Institute, Columbus, Ohio.

44. **Phase Relations in Magnesium-Lithium-Aluminum Alloys,** by D. W. Levinson and D. J. McPherson, Armour Research Foundation of Illinois Institute of Technology, Chicago.

45. **Constitution of Indium-Arsenic-Antimony Alloys,** by C. H. Shih, Massachusetts Institute of Technology, Cambridge, Mass., and E. A. Peretti, University of Notre Dame, Notre Dame, Ind.

46. **Elevated Temperature Strength of Selected Zirconium-Base Alloys,** by R. J. Van Thyne and D. J. McPherson, Armour Research Foundation of Illinois Institute of Technology, Chicago.

47. **Phase Relations in Mg-Li-Zn Alloys,** by A. F. Weinberg, U. S. Navy, and D. W. Levinson and W. Rostoker, Armour Research Foundation of Illinois Institute of Technology, Chicago.

A.S.M. Past President Dies

Herbert J. French, a vice-president of International Nickel Co. and assistant vice-president of International Nickel Co. of Canada, died in Rochester, Minn., after a long illness. Mr. French, past-president of the American Society for Metals, was 62 at the time of his death.

Herb graduated from the Columbia School of Mines in 1915 as a metallurgical engineer, and in World War I he served as an expert in this field. After the Armistice, Mr. French was with the Bureau of Standards in Washington for several years. In 1929 he joined International Nickel as a member of the metallurgical staff of its research laboratory in Bayonne, N. J. He was made assistant manager of the development and research division in New York in 1943 and four years later assumed the posts he held at his death.

Mr. French wrote many technical monographs and two books on metallurgy. He held various patents for International Nickel. In World War II, he was with the iron and steel branch of the War Production Board.

Herbert J. French

OBITUARIES

HAROLD W. POND, vice-president and general manager, Timms Spring Co., died late in August. Mr. Pond was a member of the Cleveland Chapter.

HAAKON STYRI, research consultant and metallurgist, SKF Industries, Inc., died in Germantown, Pa., Sept. 14. A native of Norway, Dr. Styri graduated from Kristiania Tekniske Skole and won the first scholarship of the American Scandinavian Foundation to Carnegie Institute of Technology, where he was graduated in 1910 in the special chemical course. In 1912 he received his Ph.D. in engineering at Konigliche Technische Hochschule, Aachen, Germany. Dr. Styri came to America in 1917 and became a metallurgist at the Hussey-Binns Steel Co. He was a professor at Carnegie Tech until 1919, when he joined SKF's research laboratory.

JOSEPH B. ENNIS, an authority on steam locomotive power and former senior vice-president of American Locomotive Co., died in Paterson, N. J. on Sept. 22, at the age of 76. Mr. Ennis was a member of New York Chapter.

E. VON HAMBACH, pioneer in the development and fabrication of stainless steels, died in August at the age of 62. He was research and development engineer for Carpenter Steel Co., where he had been for 27 years. Mr. Von Hambach, a member of the Lehigh Valley Chapter, was the author of the "Notebook on Machining Stainless Steels".

has inaugurated a summer employment bureau available not only to the student Junior members of the but to *all* students in *all* engineering schools in the United States and Canada, listing the jobs that are available and giving complete information and instructions.

Past Chairmen Hear Talk on Metal Failures

Right: J. D. Graham, Center, Discusses His Lecture on "Practical Aspects of Metallurgical Failures" With Two Members of the Indianapolis Chapter. Above: Past Chairmen who were honored during the meeting included, from left, front: R. Stall, W. Ellsworth, P. Jensen, J. Watson, H. Fletcher and D. M. Mead. Top, from left: P. Ulmer, C. Sundberg, H. Lurie, J. Duncan, J. Newsom and C. Winkler

Speaker: J. D. Graham
International Harvester Co.

At the Past Chairmen's night meeting held by the **Indianapolis Chapter,** J. D. Graham, International Harvester Co., spoke on the "Practical Aspects of Metallurgical Failures".

When abrupt changes occur in a design section, the stresses are not the same as we would expect them to be. Such changes are called stress raisers. Mr. Graham stated that stress raisers will always plague us no matter how careful we might be. Welds, riveting holes, shoulders without adequate fillets, tool holes and press fits are a few samples of design features that may intensify stress. By avoiding stress raisers the endurance limit can be increased.

Almost all metal failures are caused by fatigue—the tendency of a metal to break under conditions of repeated cyclic stressing considerably below the ultimate tensile strength. Just what happens to a metal during cyclic loading that causes it to fracture after only a few million cycles is not definitely known. Fatigue failures occur when conditions include a combination of the following: Maximum tensile stress; variation of stresses; a sufficient number of cycles. Mr. Graham stated that the problems of fatigue are vital to industry and that a great deal is yet to be learned about fatigue and the influences affecting it.

Residual stresses, frequently called locked-up stresses, can be produced in many ways. For example, excessive peening, cold working, nitriding and carburizing will set up stress patterns that can be very damaging and which may lead to ultimate failure of the material. Mr. Graham pointed out that heat treatment in particular can cause tremendous tensile stresses below the surface of a part.

One of the most important items we have to worry about metallurgically and one that we need to know more about is wear. Wear may be affected by many things. Burring during grinding operation affects wear. Mr. Graham stated that a piece of material can be heated above the critical temperature within 0.001 sec. during grinding, and such an increase in temperature can set up residual stresses on the surface of the part. The residual surface stresses may be the cause of service failures in the future.

Many failures may be attributed to grain flow. However, they can be kept at a minimum if the maximum stresses are parallel to the grain. Mr. Graham stated that grain coarseness, common in induction heating, gives higher residual stresses upon quenching.

Mr. Graham concluded that nine times out of ten all failures are usually simple fundamental failures. **—Reported by Robert Fesko for Indianapolis Chapter.**

V.D.I. to Hold Centenary

American metallurgists who are planning a European trip in 1956 should remember that the Verein Deutscher Ingenieure (the Over-All Organization of German Engineers) will be celebrating its 100th anniversary in Berlin during the week of May 12, 1956.

The V.D.I. was located in that city up to World War II, but bomb damage and Russian occupation forced it to move to Dusseldorf in 1945, where they now occupy a handsome new building of their own.

Teachers Attend Metals Technology Course

An A.S.M.'s Teachers Training Course on "Metals Technology" Has Recently Been Completed at Purdue University. Eleven teachers took the course, which was designed especially for high school and vocational teachers. Pictured are; seated, from left: W. B. Hill and C. E. Highlen, professors, Purdue University; F. Totten and M. Schlatter, Terre Haute; A. Mason, Evansville; R. Grace, professor, metallurgical engineering department, who conducted the course; F. Woerdehoff, department of industrial education; W. Eddy, V. Whetstine and E. Cruser, Indianapolis. Standing, from left: H. S. Belman, education department; H. G. McComb, state director of vocational education; H. W. Schadler, graduate teaching assistant, Purdue; R. Lindsey, Rushville; C. White, Jeffersonville; C. Welty, Hammond; A. Swope, professor, education department; G. Julius, Anderson; W. A. Williams, assistant state superintendent of vocational education, and H. Wills, Lafayette

Explains Heat Treating Processes in Controlled Atmospheres at Tri-City

Speaker: Russell F. Novy
Lindberg Engineering Co.

Fifty-six members of the **Tri-City Chapter** heard Russell F. Novy, research laboratory, Lindberg Engineering Co., speak on "Heat Treating in Controlled Atmospheres".

Mr. Novy remarked that industry is constantly searching for unit cost reductions. Controlled atmosphere heat treating aids in cost reductions because it can give superior results with a given steel, reduce or eliminate finishing cost, and make possible a wider use of the lower class steels.

The purpose of a furnace atmosphere is to eliminate oxidation; the gas must therefore be reducing in nature. Pure hydrogen has the greatest reducing power of any of the molecular gases but is too expensive for wide usage. The popular generated gases fall into three classes: Dissociated ammonia (nearest substitute for pure hydrogen); endothermic atmosphere; and exothermic atmosphere.

The operation of each type of generator was traced through on schematic drawings shown on slides. Because of comparative cost, the dissociated ammonia is usually used only for the processing of stainless steels and some specialty items, such as nickel irons and high silicon irons. The exothermic atmosphere, the least expensive of those under discussion, is limited mostly to the bright annealing of copper, brass and bronze, the sintering of metal frits, silver soldering, and the heat treating of common steels where some decarburization is not objectionable. This atmosphere is not capable of low CO_2 and water vapor contents, as these are products of the exothermic combustion.

The heart of Mr. Novy's talk was a discussion of the endothermic generator and of furnaces for its utilization. The endothermic generator uses a low ratio of air to raw gas which does not support combustion. The raw gas can be natural gas, propane or butane. The cracking takes place in a heated catalytic bed treated with nickel nitrate. Nominal analysis is: 40% hydrogen, 20% carbon monoxide, +0 to 3% carbon dioxide, small amounts of methane, and balance nitrogen.

The dew point of this gas can be altered from approximately 0° F. to 70° F. by slight changes in the ratio of air to raw gas input. In the last 4 or 5 years, exacting curves showing carbon potential versus dew point have been developed. From such a curve, the proper dew point can be determined for the neutral heat treatment of a particular steel. It should be stressed that these curves apply only to the endothermic generated atmosphere. Automatic dew point controls are available for these generators.

The endothermic atmosphere is an excellent carrier gas for gas carburizing or carbonitriding. Homogeneous carburizing is a term describing the process of carburizing a low carbon steel uniformly all the way through.

Mr. Novy's discussion of furnace types included the new low-voltage electric elements and an illustrated description of radiant gas tube design and function. Relative operating costs of various furnaces and generators were mentioned. The session was concluded with a discussion of several questions from the audience **—Reported by Ralph Moon for Tri-City Chapter.**

Hot Formed Heavy-Duty Industrial Springs Is Topic at Peoria Meeting

Speaker: Erwin T. Bittner
American Steel Foundries

Erwin T. Bittner, chief metallurgist, American Steel Foundries, presented a talk on "Hot Formed Heavy-Duty Industrial Springs" at a meeting in **Peoria.**

A series of slides, presented with the talk, outlined the steps of manufacturing heavy-duty coiled springs. Mr. Bittner stated that high spring hardness is very important to the elimination of permanent set in the springs.

Before a spring is placed in service, it is compressed to a solid length. This special process, called a "set-down operation", raises the yield point of the material and this will reduce the amount of permanent set that the spring will acquire while in service.

Mr. Bittner emphasized the detrimental affect of surface defects on the life of a spring and discussed the improvements that can be obtained by carbon restoration and shot peening. The spring manufacturers and the steel mills are continually working together to correct these surface defects.**—Reported by James M. Warfield for Peoria.**

New Films

Die Casting
How Else Would You Make It?

The American Zinc Institute's 35 min., 16-mm. color and sound film tells how designers are able to effect reductions in costs and shape a better product by exploiting the virtues of the die casting process. The film depicts the scope and versatility of the process by illustrating the widespread production and use of die castings in the world of commerce, industry, transportation and the home.

The movie can be borrowed by writing to: American Zinc Institute, 60 East 42 St., New York 17, N. Y.

Ductile Cast Iron

A 15-min. sound, color film on the properties and applications of ductile cast iron has been released by the International Nickel Co. and is now available to technical and educational groups. The film illustrates that the new engineering material which can be cast like gray iron has properties similar to steel. The ductility of the iron is illustrated by bending, twisting, impact and tensile tests.

Prints of the film may be obtained by writing to: Nickel Information Service, International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

To Enrich Mankind

A 25-min. color film, prepared by the American Society of Mechanical Engineers, designed to explain to the public the significance of the role of mechanical engineering in the development of our country.

Prints may be obtained by writing to: Barbara A. Brown, Public Relations Dept., A.S.M.E., 29 West 39 St., New York 18, N. Y.

At Worcester's Annual Smorgasbord

Present at Worcester Chapter's Annual Smorgasbord Were, From Left: Edward F. Grady, Metallurgist, Rockwood Sprinkler Co., Technical Chairman; Walter Flaherty of Watertown, Mass., Humorist, Who Spoke; Wendell J. Johnson, Sales Engineer, Massachusetts Steel Treating Corp., Toastmaster; and Herbert D. Berry, Thomas Smith Co., Chapter Chairman, Who Presided

Fort Wayne Hears Talk On Automation at First Meeting of the Season

Speaker: H. A. Franke
Ford Motor Co.

Herbert A. Franke, manager of the automation department, Ford Motor Co.'s stamping plant, spoke on "Automation" at a meeting held by the **Fort Wayne Chapter.**

Mr. Franke described automation as the automatic handling of material between progressive manufacturing operations.

In tracing the history of automation, Mr. Franke pointed out that machine operators formerly could load and unload machines rapidly enough to operate at close to rated capacity. However, as machine tools were improved, and thus developed faster feeds and speeds, automatic loading and unloading equipment became necessary in order to utilize these higher speeds and feeds. Once this was accomplished, the various machines were mechanically connected with automatic conveyors and a new industrial era was born.

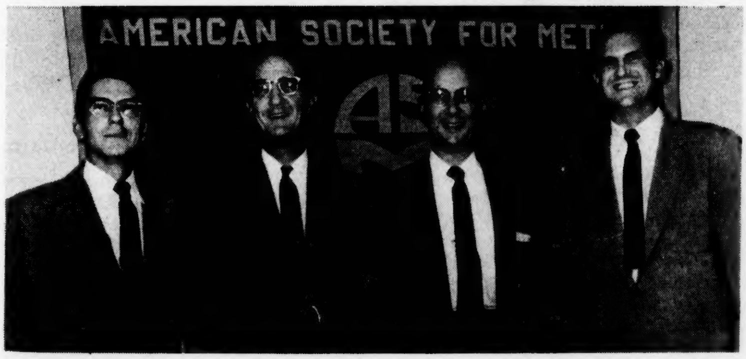
While mentioning the advantages of automation, Mr. Franke pointed out that percentage-wise, the total population is growing more rapidly than the labor force, and, therefore, automation is needed to satisfy the growing demand for consumer goods. A better standard of living is also available at lower prices because of this new technique, which is felt as being as important now as the mass production technique was in bringing automobile prices within the buying public's reach. Among the technical advantages are more uniformity of product, and less scrap and rework than was formerly necessary when parts struck each other or were dropped on the floor.

The chief disadvantage of automation lies in the fact that if any machine is down, the complete line is down, which results in considerable expense. This item is held to a minimum by well-planned preventative maintenance.

Mr. Franke stated that automation would not create unemployment as the critics fear but would open up new skills and trades. He illustrated this point by stating that in the telephone industry, there are now more dial telephones than ever before, and yet there are now more telephone employees than ever before, which shows that the mechanization of the telephone exchanges did not create the unemployment that had originally been feared.

Mr. Franke's talk was followed by motion pictures which portrayed the extent of this new method in the automotive industry.—**Reported by J. P. Crosbie for Fort Wayne.**

Wichita Welcomes Incoming Officers



Officers Elected by the Wichita Chapter for 1955-56 Include, From Left: Charles Kimball, Treasurer; Louis Montre, Chairman; Jonathan Ewert, Secretary; and William Ellis, Vice-Chairman. (Photograph by A. A. Melby)

Speak at Indiana's Welding Symposium

Speakers at the Indiana Chapters Spring Symposium on "Metallurgy of Welding" Held Recently at Purdue University Included, From Left: J. M. Parks, Manager, Metallurgical Process Division, Air Reduction Corp.; David Swan, Assistant Director of Research, Metals Research Laboratories; Walter Crafts, Associate Director of Research, Metals Research Laboratories, Technical Chairman; George E. Linnert, Research Metallurgist, Armco Steel Corp.; and W. D. Doty, Research Engineer, U. S. Steel Corp.

In one of the outstanding technical meetings of the year, the Indiana Chapters A.S.M. presented at Purdue University a symposium on the "Metallurgy of Welding".

Walter Crafts, associate director of research, Metals Research Laboratories Division, Electro Metallurgical Co., served as technical chairman. First of the four speakers was David Swan, assistant director of research, Metals Research Laboratories Division, Union Carbide & Carbon Corp., who discussed the "Basic Metallurgy of Welding".

The forces that hold two pieces together in welding are atomic forces, Mr. Swan pointed out. If the surfaces can be forced together, welding may take place even without heat—for example, the cold pressure method for soft-grade aluminum and copper alloys.

The arc welding process is controlled by several variables. The voltage impressed between the arc and the work is fairly well fixed, and current is the controlling factor on the rate of deposition. Another variable is the method of arc protection. Among those used are mineral and organic coatings on rods, submergence of the arc in a granulated mineral, and gaseous protective agents such as helium and argon. These protective agents control the mode of metal transfer, protect the weld puddle from oxidation, enable alloying additions to be made and determine the operating characteristics of the arc. They also influence the freezing of the weld puddle.

In steel welding, nugget size is of primary importance, and decreases as speed of travel is increased. At the same time, the penetration is decreased and the quenching effect is aggravated. This results in very high hardness in the heat affected zone next to the weld, with consequent low ductility.

W. D. Doty, research engineer for welding, U. S. Steel Corp., delivered the second address on the "Metallurgical Aspects of Welding Free-Machining and High-Strength Alloy Steels". In welding of free-machining steels, the influence of hydrogen is of first importance, since it combines with sulphur to form H_2S gas, resulting in "worm-hole porosity". Welding rod coatings with a high cellulose content are the worst offenders in this respect.

The heat-affected zone controls the utility of a given weld system to a large extent, since this zone may develop adverse mechanical properties on cooling. Cooling rate is dependent on plate thickness, energy input and plate temperature. A large grain size in the heat-affected zone has a deleterious effect on the final properties of the joint. Increasing plate thickness increases the speed of cooling and tends to increase the hardness of the constituent.

U. S. Steel has recently introduced a new high-strength steel called USS "T-1", having properties which are not too severely affected by welding. This steel has good notch toughness even at extremely low temperatures, and its mechanical properties are not markedly changed by welding or by a stress-relief treatment at 1100° F.

George E. Linnert, research metallurgist, Armco Steel Corp., explained the "Metallurgy Involved in Welding High-Temperature and Corrosion Resistant Alloys". Mr. Linnert, in a new approach to the problem, detailed the role played by each of the principal alloy constituents.

One of the common troubles experienced in the welding of stainless steels is in the precipitation of carbides at grain boundaries. There are three solutions; one is to re-solution treat or anneal the material and give it a drastic quench after the welding operation, another is to use a stabilized stainless steel, and the third is to use an extra-low-carbon grade. The stabilized steels most commonly employed are AISI Types 321 and 347. These steels contain a small percentage of titanium or columbium which have an affinity for carbon and prevent its precipitation.

The concluding lecture was delivered by J. M. Parks, manager of the metallurgical process division, Air Reduction Corp., on "New Developments in the Field of Welding". According to Dr. Parks, the final test of the value of a development in welding (or any other industry), is: "Does it make money for the people who are attempting to use it?" As a result of wartime pressure, a lot of the black art has been taken out of the welding game and some of the fundamentals are now being understood and publicly discussed for the first time.

One development is the use of stranded wire made from two or more compositions that cannot be satisfactorily alloyed and drawn as a single wire.

Dr. Parks described the arc cutting of aluminum and stainless steel, which requires accurate control; it is a high-speed operation in which the electrode extends through the plate and cuts as it traverses.

The process of pressure welding aluminum and copper alloys is new and requires extreme cleanliness of the metals to be finished. It is ordinarily necessary to precede the welding operation by mechanical scraping or brushing to remove impurities and oxide films.

A movie was shown of the actual welding process, which was also explained in detail by Dr. Parks.

The meeting was summarized by Technical Chairman Crafts and words of appreciation were spoken by the chairman of the Indianapolis Chapter, W. W. Brandel, and by Carl O. Sundberg, the Symposium chairman.—**Prepared by J. E. Mitchell.**

Metal Progress on Microfilm

Microfilm editions of *Metal Progress* are available for distribution to libraries and other organizations, in accordance with an agreement recently concluded between the American Society for Metals and University Microfilms.

Several volumes of *Metal Progress* have already been reproduced on microfilm and can be ordered by writing directly to: University Microfilms, 313 North First St., Ann Arbor, Mich.

Outlines Problems of Nuclear Reactors

Members of the Chattanooga Chapter Heard a Talk on "Metallurgical Problems in Nuclear Reactors" at a Recent Meeting. Shown are, from left: L. N. Wall, secretary-treasurer; Jack Stocker, vice-president; John H. Frye, Jr., Oak Ridge National Laboratory, speaker; and Ab Flowers, chairman

Speaker: John H. Frye, Jr.
Oak Ridge National Laboratory

At the last regularly scheduled meeting of the **Chattanooga Chapter** for the 1954-55 season, John H. Frye, director of the metallurgy division, Oak Ridge National Laboratory, spoke on "Metallurgical Problems in Nuclear Reactors".

Dr. Frye described a typical pile, which uses uranium-235 as fuel to produce heat and as the source of radioactive isotopes which have become important in research and industry.

The basis for the reaction in a reactor is uranium-235, which might be obtained from pure uranium or from a mixture containing uranium. Only about 0.6% of uranium is uranium-235. The energy from uranium-235 is obtained in the reactor as a result of neutron bombardment. These neutrons are obtained by fission of the uranium-235. Other elements capture these neutrons and cause the reaction to slow down. This slowing down by foreign elements may be a safety measure and controlled as such, or it may be an undesirable slowing down or "poisoning" of the reactor. The activity of the reactor must be kept up to a minimum level. Dr. Frye showed a diagram of a typical pile which illustrated its massive concrete insulation, carbon construction, ventilating system, spaces for substances undergoing isotope formation and boron steel rods which can be moved into or out of the pile to either slow down or to speed up the reaction.

Dr. Frye also described a possible reactor-driven vehicle. Such a system would consist of a reactor, a heat transfer medium and a boiler. The reactor might get its heat from a uranium core clad with Inconel to keep the fission products in. The heat would be carried by some liquid metal to the boiler. Each of these stages would present its problems. Protection from radiation, poisoning of the reactor, liquid transfer medium, corrosion and mass transfer, were mentioned as some of the problems.

Dr. Frye used slides to illustrate experiments done in the study of corrosion and mass transfer by liquid metals in metal tubes. Mass transfer refers to the phenomenon of carrying the corrosion products from the hot part of the system and depositing them in the cold part where they often completely block the tubing in the cold part. Each of these problems has to be solved in designing a reactor-boiler system.

Comparing the relative cost of atomic energy to common fuels, Dr. Frye gave these figures: To produce a million BTU of energy would require 15c worth of coal, $1 worth of gasoline, and 30c worth of uranium-235. This means that uranium-235 would be competitive to gasoline but more expensive than coal.—**Reported by J. H. McMinn for Chattanooga.**

Announce Changes in ASM Achievement Awards

One of the highly effective services of A.S.M. has been its sponsorship of Science Achievement Awards in the nation's junior and senior high schools.

This is the fourth year for the Science Achievement Award Program in which a total of 224 young students, both boys and girls, will receive awards for their projects in the various fields of science.

There are three classifications of awards for the current program. In the senior grades, cash awards of $100, $75 and $50 are given for the first, second and third awards. In the junior grades, U. S. Bonds are awarded in the amount of $50 and $25 for the first and second awards. For those students who achieve distinction in their entries without winning one of the cash or U. S. Bond awards there are honor certificates.

In the 1955-56 Science Achievement Award Program, which has already begun, all awards will be made in U. S. Bonds rather than cash. This is in line with the general feeling expressed by the educational administrations of the various states.

No high school science teacher awards will be made in the 1955-56 program. This change is also in agreement with the general policy of educational administrations.

In the changes inaugurated for the next Science Achievement Award Program, A.S.M. expects to extend the benefits to a larger number of students and into a wider area of schools. As in the past four Science Achievement Award Programs, administration of details are to be handled by the National Science Teachers Association in Washington, D. C.

Toledo Chapter Installs New Officers

Members of the Toledo Chapter Elected as Officers for the 1955-56 Season Include, From Left: Charles Haughey, Surface Combustion Co., Educational Co-Chairman; Dean Seizert, Ohio Fuel Gas Co., Vice-Chairman; Cal Cummings, Ford Motor Co., Secretary-Treasurer; Lawrence Albright, Industrial Heat Treating Co., Chairman; and William Heer, Owens-Illinois Glass Co., Program Chairman. (Reported by Lawrence R. Albright)

Metallurgical News and Developments

Devoted to News in the Metals Field of Special Interest to Students and Others

A Department of *Metals Review,* published by the
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Hot Cell — A hot cell laboratory, the first of three major units in Battelle Memorial Institute's new atomic energy research center, has been completed. It is the first of its capacity to be built without the aid of federal funds.

Fiber Metallurgy — A metallurgical technique, known as fiber metallurgy, has been developed at Armour Research Foundation of Illinois Institute of Technology. The technique, which involves the use of short metal fibers, can result in bodies which can be made into products having a wide range of porosities combined with relatively high strength and toughness.

Last Laugh — The Russians, who used to laugh at the capitalistic practice of scrapping old but usable machinery, are reported to be doing a lot of junking of their own.

Mockups — Nuclear reactor mockups for training and exhibition purposes are being produced by Leeds & Northrup Co. Forty colleges offering courses in nuclear engineering will probably represent the major market for the mockups, which cost between $11,000 and $17,000.

Transistors — High-frequency transistors which have generated more than a billion oscillations per second have been developed by Bell Telephone Laboratories. This development may break a barrier that has kept the transistor out of radar and high-frequency communication equipment.

Ethyl Fellowships—Ethyl Corp. has announced the award of 19 graduate research fellowships in the fields of mechanical and chemical engineering and chemistry. Total value of the awards is about $45,000.

Metal Cutting Grants—The Research Fund of the American Society for Tool Engineers has awarded a $30,000 contract to the John Crerar Library of Chicago to compile a metal cutting bibliography with abstracts of all available information from 1943 to date.

Atoms for Peace—The Atoms for Peace Conference at Geneva closed with the signing of documents turning the United States' exhibit reactor over to Switzerland for research work on peaceful uses of atomic energy. The reactor was designed and built at Oak Ridge National Laboratory.

AEC Research—The Department of Commerce has undertaken a program, through a cooperative arrangement with the Atomic Energy Commission, to make public as promptly as possible unclassified AEC research reports of industrial significance.

Symposium—A one-day symposium on the "Mechanism of Phase Transformations in Metals" will be held by the Institute of Metals on Nov. 9 in London. Eighteen papers, mainly describing original work, have been contributed to the symposium.

Lecture Series—A series of seven monthly lectures will be presented on the third Wednesday of the month during the coming year by Illinois Institute of Technology. Subjects include Mechanical Engineering Aspects of Nuclear Power Reactors, Titanium Outlook (to be held in conjunction with a meeting of the Chicago Chapter A.S.M.), Engineering Applications of the Electronic Computer, Review of Fundamentals and Recent Work in Shell Theory, Vibration, Structural Research, and Fluid Mechanics Aspects of Multi-Stage Compressors.

Radiation Lab — General Electric Co. has opened its new radiation laboratory to delve further into peacetime uses of the atoms. The $300,000 structure, converted from a former factory building, will specialize in testing radioactive materials and high-energy radiation equipment.

Establishes Scholarship — International Nickel Co. has established a fellowship for research in metallurgy at Harvard University. Of the approximately $8000 to be provided each year, half will be used for one or more fellowships and the other half may be used by the Division of Engineering and Applied Physics at its discretion.

Welding Course—A course on Inert Gas Welding is being offered by the University of Akron (Ohio) in cooperation with the Akron Chapter A.S.M. The course will cover preliminary metallurgical problems and applications to modern industrial requirements.

Student Receives Science Award

James Pirie, Honor Student at Pasco High School, Pasco, Wash., Is Shown Being Congratulated by William R. Smith, Chairman of the Columbia Basin Chapter, Upon the Presentation of the A.S.M. Science Achievement Award for His Outstanding Scholastic Achievements, His Desire to Enter the Field of Science and Financial Need. Jim plans to enter the University of Washington and major in engineering. (Report by L. Chockie for Columbia Basin Chapter)

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Nov. 21	Engineers Club	J. F. Victory	Some Problems of High-Speed Flight
Canton-Massillon	Nov.	Mergus Restaurant	R. J. Perrine	Heat Treating Atmospheres
Carolinas	Nov. 17	Burlington, N. C.	J. R. Townsend	Fatigue and Its Relation to Mechanical and Metallurgical Properties
Columbia Basin	Nov. 2		G. Moudry	Extrusion of Metals
Dayton	Nov. 9	Engineers Club	R. L. Mattson	Applied Residual Stress Analysis
Detroit	Nov. 14	Engineering Society	Porter Wray	Selection of Engineering Steels
Eastern New York	Nov. 8	Panetta's		Cermets—Past Chairmen's Night
Fort Wayne	Nov. 14		J. Libsch	Induction Heating
Indianapolis	Nov. 21		A. O. Schaefer	Testing and Inspecting Steel Forgings
Jacksonville	Nov. 14	W. L. Rives Co.		Plant Visit—Welding, Nonferrous Alloys, Stainless Steel, Aluminum Alloys
Long Island	Nov. 16		C. H. Lorig	Mild Steel—Its Ductile to Brittle Transition
Los Angeles	Nov. 17	Rodger Young Auditorium	J. V. Russell	Heat Treatment and Mechanical Properties of Alloy Steels
Mahoning Valley	Nov. 8	Post Room, V.F.W.	A. O. Schaefer	Applications of Emergency Metallurgy to Peace-Time Work
Milwaukee	Nov. 15	City Club	L. E. Gibbs	Copper-Base Alloys
Minnesota	Nov. 1			Joint Meeting-A.S.M.-A.F.S.
Montreal	Nov. 7		F. M. Richmond	Super-Alloys, Heat Treatment and Applications
Muncie	Nov. 8	New Castle	W. L. Grube	Electron Metallography
New Jersey	Nov. 21	Essex House	John Kahles and Michael Fields	Machining of Stainless Steels, Super-Alloys and Titanium
New Orleans	Nov. 2		R. Aborn	Metallurgy of Ferrous Welding
New York	Nov. 14	Hotel Victoria	A. O. Schaefer	Importance of Standards to Industry
Northeast Pennsylvania	Nov. 10		Samuel Spring	Metal Cleaning and Preparation for Finishing
Northwestern Pennsylvania	Nov. 17	Meadville		
Notre Dame	Nov. 9		F. B. Rote	Metallurgical Control of Malleable and Pearlitic Malleable Iron
Oak Ridge	Nov. 16	S & W Cafeteria, Knoxville	W. S. Pellini	Brittle Fracture—Cause and Prevention
Ontario	Nov. 4	Royal Connaught, Hamilton	W. H. Irwin	Recent Developments in Field of Nonferrous Metallurgy
Oregon	Nov. 4	Mallory Hotel		Extrusion of Metals
Ottawa Valley	Nov. 8	P.M.R.L.	W. C. Winegard	Use of Isotopes as Tracers in the Segregation of Alloys
Philadelphia	Nov. 25		S. D. Fletcher	Tool and Die Steels
Philadelphia Junior Section	Nov. 14	Engineers Club		Corrosion in Action
Puget Sound	Nov. 3	Engineers Club	G. Moudry	Extrusion of Steel, Titanium and Aluminum
Purdue	Nov. 15	Purdue Memorial Union	L. P. Tarasov	Current Ideas and Problems
Rocky Moutain Denver	Nov. 18		N. L. Deuble	Molybdenum in Metallurgy
Rome	Nov. 7	General Cable Corp.		Plant Visit
Saginaw Valley	Nov. 22	Fischer's	F. L. Brown	Metallography Behind the Concrete Curtain
Syracuse	Nov. 1	Onondaga Hotel		
Tri-City	Nov. 8	Rock Island Arsenal	W. E. Pellini	Metallurgical Aspects of Brittle Fracture Problem
Washington	Nov. 14		Hiram Brown	Metallurgical Problems in Production of Aircraft Turbine Engines
West Michigan	Nov. 21	Lock's Restaurant	U. H. Gillett	Metallurgical Aspects of Machinability
York	Nov. 9	Harrisburg	H. N. Meyer	Steel Rolling Practice

Explains Metals Economic Background

Shown at a Meeting of the Jacksonville Chapter Are, From Left: S. M. Bowes, Secretary-Treasurer; H. J. Huester, Program Chairman; Joe Campbell, Chairman; J. S. Kirkpatrick, Brooks and Perkins, Inc., Who Spoke on "Economic Background of Metals"; and T. D. Tyra, Naval Air Station

Speaker: J. S. Kirkpatrick

Brooks and Perkins, Inc.

James S. Kirkpatrick, vice-president, research and development, Brooks and Perkins, Inc., spoke on the "Economic Background of the Newer Metals" at a meeting held by the **Jacksonville Chapter.**

Mr. Kirkpatrick discussed the general economic background of the newer metals. He explained the price volume relationship of the amount of metals that a dollar would buy and traced the general price trend of aluminum, zinc, magnesium, titanium and zirconium.

The B-36 was the first large airplane in which a great deal of magnesium was used. Mr. Kirkpatrick explained that this usage had done much to make people aware that the corrosion and fire hazard of magnesium had been greatly overexaggerated. Some of the problems of selling a new metal to the designer were also explained.

Of all the new light metals, the aluminum alloys are the only ones that are generally accepted by the average shop man, but the knowledge of the value of magnesium and titanium is rapidly increasing their usage.

Mr. Kirkpatrick showed slides illustrating the use of magnesium in the materials handling field. Many large stores have found it economical to use magnesium equipment in handling food, baked goods and merchandise.

While there are different points of view on methods of working magnesium and titanium, Mr. Kirkpatrick stated that his company believes that hot forming and drawing yields better parts and that hot deep drawing as practiced in their Detroit plant for the past 13 years has proven highly satisfactory.

Zirconium is one of the newer metals that seems to fall into the hot work family and some very interesting stampings have been turned out at Brooks and Perkins.

Prior to the meeting, members and guests were taken on a tour of the Overhaul and Repair Department at the Naval Air Station.

The vital services that the O & R department offer the naval aviation forces were pointed out. Plating, fabricating, finishing, machining, rebuilding and many other operations were included in the tour.—**Reported by H. J. Huester for Jacksonville.**

Presents Course on Uranium Prospecting

Speaker: Donald L. Masson

Washington State College

An educational series on "Uranium Prospecting" presented by the **Columbia Basin Chapter** was recently concluded by Donald L. Masson, chairman of the department of mining at Washington State College.

In three sessions, Dr. Masson discussed the geology of uranium deposits and practical prospecting methods.

The first of the lectures covered fundamental geologic processes such as the formation of primary and secondary deposits, igneous intrusions, secondary enrichment and sedimentation, along with geologic details of some of the prominent producing uranium deposits.

In his second lecture, on prospecting methods, Dr. Masson identified the principal uranium minerals and outlined the best methods of prospecting for and detailing an ore body by the use of radiation detecting instruments. The interesting and important legal aspects of staking, filing and holding claims were also presented.

The third and final session of the course was devoted to the showing of a motion picture on "Mining on the Colorado Plateau" and a display of uranium prospecting instruments furnished by the Scientific Supplies Co. of Seattle and Uranium Enterprises Co. of Spokane.—**Reported by D. P. O'Keefe for Columbia Basin Chapter.**

D. L. Masson

Fatigue Testing Is Subject At Southern Tier Meeting

Speaker: Arthur F. Underwood

General Motors Research Laboratories

The first meeting of the season held by the **Southern Tier Chapter** featured a talk on "Fatigue Testing" by Arthur F. Underwood, head of the mechanical development department, General Motors Research Laboratories.

Mr. Underwood discussed the testing of full-size components and described the very versatile testing equipment in use at his laboratory. Numerous slides and photographs were shown illustrating the operation of this equipment, including the application of various types of stress such as torsion, tension and compression applied in desired and controllable sequences.—**Reported by R. E. Groethe for Southern Tier Chapter.**

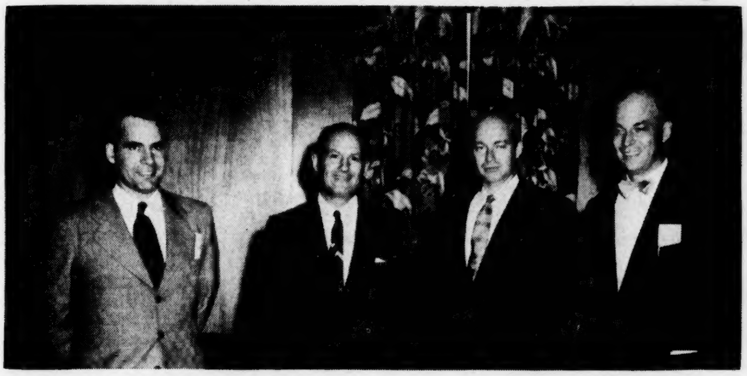
Metal Progress Appoints District Manager for the Cleveland-Pittsburgh Area

Appointment of William J. Hilty as the Cleveland-Pittsburgh district manager for *Metal Progress* has been announced by A. P. Ford, sales manager. Mr. Hilty succeeds Donald J. Billings and will cover Cleveland and Pittsburgh, as well as other cities in the district.

Bill has been associate account executive with Fuller & Smith & Ross, Inc., Cleveland advertising agency, for the past three years. Prior to that time he had been advertising manager of the Flxible Co., Loudonville, Ohio.

A graduate of Fenn College and a bombardier-navigator during World War II, Bill is now public information officer for the 9026th Air Reserve Squadron, Cleveland. He is married and has two children.

Gives Basic Reactions in Heat Treating



At a Meeting of Eastern New York Chapter, Morris Cohen, Massachusetts Institute of Technology, Discussed "Basic Reactions in Heat Treatment of Steel". Shown are, from left: A. A. Burr, program chairman; Dr. Cohen; John G. McMullin and W. R. Hibbard, chairman of the Chapter

Speaker: Morris Cohen
Massachusetts Institute of Technology

The **Eastern New York Chapter** enjoyed a refreshing review of "Basic Reactions in Heat Treatment of Steels" by Morris Cohen, professor of physical metallurgy at Massachusetts Institute of Technology.

Dr. Cohen presented a review of the structures present in steel during the various steps in its heat treatment.

Starting from basic definitions, he followed the internal structural changes during treatment with graphs and electron micrographs and correlated these structures with attendant physical properties. Considerable time was spent discussing the martensite reaction, key to all steel hardening procedures, especially how it is influenced by the carbon content of the steel and its ultimate effect on the structural properties.

The tempering process was examined through a discussion of hardness changes, covering the change in hardness with increasing tempering temperatures, and considering the associated reactions of unstable carbide precipitation, transition of unstable carbides to cementite, as well as the phenomena of secondary hardening.

Dr. Cohen then discussed the effect of tempering temperature on elastic limit for various types of steels. He examined the factors influencing elastic limit and showed a distinct similarity in the dependence of endurance limit and elastic limit on the final hardness value of the steel. He indicated that we may some day be able to evaluate endurance limit from elastic limit determinations.

The final phase of Dr. Cohen's talk was concerned with the improvement of elastic limit in today's ultra-high strength steels by careful alloying. A small percentage of silicon seems to be the most promising addition as it delays carbide precipitation and permits the use of somewhat higher tempering temperatures. Avoidance of the detrimental network carbides and the reduction of residual stresses by higher tempering temperatures contribute significantly to elastic limit values.—**Reported by N. E. Doyle, Jr., for Eastern New York Chapter.**

History and Future of Bronze Founding Topic At Ottawa Valley Chapter

Speaker: Harold J. Roast
Consulting Metallurgist

At the Sustaining Members' Night meeting of the **Ottawa Valley Chapter**, Harold J. Roast, metallurgical consultant and consulting editor, *Metal Progress*, presented a talk entitled "A Backward, Present and Forward Look at Bronze Metallurgy".

Mr. Roast outlined the growth of metallurgy in general over the past 50 years and, in particular, the growth of bronze founding.

At the beginning of this era, he pointed out, foundries operated by "rule of thumb" methods, but since that time the metallurgist has more and more become recognized as an essential requirement of the foundry.

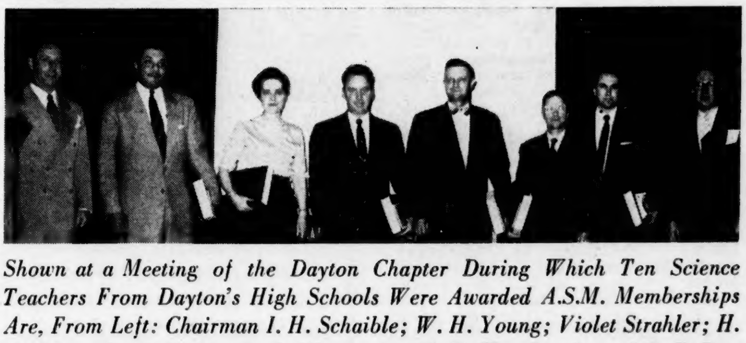
The speaker attributed much of the improvement in the quality of bronze castings to such factors as the development of purer metals, the discovery of the important role played by certain impurities and heat treatment, better testing and inspection techniques, improved methods of temperature measurement and control and the use of standard alloy specifications.

Mr. Roast stated that, in the past, the chemical analysis of a successful part was frequently used as the basis for a specification, which led to the use of numerous alloys. However, as the result of the work of such organizations as A.S.M. and A.S.T.M., it has been found that a relatively small number of standard alloys will satisfy most engineering requirements.

With regard to present foundry practice and research, Mr. Roast discussed continuous casting, powder metallurgy, vacuum melting and levitation melting, as well as atomic tracer work. He pointed out that the pilot foundry is now considered a valuable adjunct to the production foundry as it has been found to be of considerable assistance in reducing the amount of scrap produced.

As to the future, the speaker stated that metallurgists face the challenge of developing new alloys such as those urgently required by aircraft designers for use at elevated temperatures. He expressed the opinion that the mathematical approach to physical metallurgy and the statistical analysis of foundry production would become more widely used in the immediate future.—**Reported by P. J. Todkill for Ottawa Valley Chapter.**

Dayton Awards Memberships to Teachers



Shown at a Meeting of the Dayton Chapter During Which Ten Science Teachers From Dayton's High Schools Were Awarded A.S.M. Memberships Are, From Left: Chairman I. H. Schaible; W. H. Young; Violet Strahler; H. A. Stites; R. A. Smith; D. C. Niswonger; W. H. Hornbrook; and E. E. Barney, Chairman of the Dayton Chapter's Scholarship and Awards Committee

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared by the Technical Information Division of Battelle Memorial Institute, Columbus, Ohio

A — General Metallurgical

116-A. Utah's Geneva Works: Producer of Steel for Western Industries. Charles Longenecker and Harry E. Trout. *Blast Furnace and Steel Plant,* v. 43, Aug. 1955, p. 869-908.
Availability of raw materials, coke and coal chemical division, blast and openhearth furnaces, blooming, slabbing, structural and strip mills, power plant and utilities, metallurgy, maintenance, transportataion, industrial relations, safety program. Photographs, diagrams, tables.
(A5, D general, F general, ST)

117-A. Use of Electricity in the Steel Industry. W. F. Cartwright. *Engineer,* v. 200, July 22, 1955, p. 116-117.
How iron and steel industry affects national electrical generating industry, now and in the future. Tables. (A4, ST)

118-A. The Price of Copper, 1955-1975. William P. Shea. *Engineering and Mining Journal,* v. 156, Aug. 1955, p. 94-99.
Prediction of world requirements, supply and prices. Tables, diagrams. (A4, Cu)

119-A. Costing of Gravity-Die-Castings: Approach to the Problem in a Small Non-Ferrous Foundry. G. R. Cowley. *Foundry Trade Journal,* v. 99, July 28, 1955, p. 95-98.
How job costing can be developed into standard costing and hence into budgetary control. Although specifically prepared in relation to die-castings much of the precept and practice equally well applies to sand founding. (A4, E13)

120-A. Mechanized Handling in Foundry Cuts Worker Fatigue, Adds Safety. *Flow,* v. 10, Aug. 1955, p. 67-71.
Improvements resulting from adoption of modern methods. Photographs.
(A5, E general, CI)

121-A. Iron and Steel in Canada. Gustad P. Contractor. *Iron & Steel,* v. 28, Aug. 1955, p. 384-386.
Data on steel production in British Columbia. Tables. 25 ref.
(A general, B10)

122-A. Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 22, July 1955, p. 309-316.
From "pyrolysis" through "radioactive decay". (To be continued.)
(A10)

123-A. Environment in the Foundry. *Modern Castings and American Foundryman,* v. 28, July 1955, p. 47-78.
Ventilation, health protective measures, safety precautions. Photographs, graphs. (A7, E general)

124-A. No Chain Failures in This Foundry. Jess Hogans. *Modern Castings and American Foundryman,* v. 28, Aug. 1955, p. 62-65.
Standard procedure for procuring, inspecting and maintaining chains and slings. Photographs, diagram. (A5, E general)

125-A. The Biological Action of Particulate Cobalt Metal. G. W. H. Schepers. *Archives of Industrial Health,* v. 12, Aug. 1955, p. 127-133.
Experiments to confirm the acute toxicity of particulate cobalt metal and to determine what chronic lesions ensued in animals which survived the intratracheal introduction of the dust. Micrographs. 5 ref. (A7, Co)

126-A. The Biological Action of Particulate Tungsten Metal. G. W. H. Schepers. *Archives of Industrial Health,* v. 12, Aug. 1955, p. 134-136.
Tungsten dust as a causative agent of the respiratory symptoms in workers in the cemented tungsten carbide tool industry. Micrographs. 8 ref. (A7, W)

127-A. Australian Iron and Steel Industry. *Engineer,* v. 200, Aug. 19, 1955, p. 267-269.
Post-war developments in the industry and plans for opening up new sources of raw materials. Map.
(A general, B10, ST)

128-A. G.E. Metals and Ceramics Laboratory. A. J. Kiesler and R. E. Cech. *Foundry,* v. 83, Sept. 1955, p. 148-151.
Laboratory designed to strengthen the bond between the metallurgist and the metal producer. Diagram, photographs. (A9)

129-A. New Power, Steam and Blowing Installations at the Ohio Steel Works. J. P. Katzenmeyer. *Iron and Steel Engineer,* v. 32, Aug. 1955, p. 109-117; disc., p. 117-120.
Revision of power, steam, and blowing facilities by replacing obsolete and inadequate equipment. Tables, photographs, diagrams.
(A5, ST)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

130-A. Some Comments on Waste-Heat Recovery Practice. W. Gregson. *Iron and Steel Institute, Journal,* v. 180, Aug. 1955, p. 369-374; disc., p. 374-377.
Present state of the art of waste-heat recovery as applied to the steel industry. Refers to further possibilities of heat recovery, in particular from the sensible heat in molten blast furnace slag and in coke. Diagrams, photographs. (A8, D1, ST, CI)

131-A. What's the Long-Term Outlook for Machine Tools? Sumner H. Slichter. *Iron Age,* v. 176, Aug. 25, 1955, p. 201-204.
Increased demand seems most likely; long-range planning and product innovation will add impetus to trend. Photographs. (A4, G17)

132-A. Structure and Performance in the Titanium Industry. Francis G. Masson. *Journal of Industrial Economics,* v. 3, no. 3, July 1955, p. 222-240.
Economic treatise on interplay of government, competition and diversification in the titanium industry. Table. 11 ref. (A4, Ti)

133-A. Treatment of Electroplating Wastes. A. E. J. Pettet. *Product Finishing,* v. 8, July 1955, p. 54-60.
Composition of wastes and general treatment methods. Photographs, tables. (To be continued.)
(A8, L17)

134-A. Treatment of Electroplating Wastes. A. E. J. Pettet. *Product Finishing,* v. 8, Aug. 1955, p. 57-63, 102.
Methods by which wastes can be treated. Individual waste treatments, biological cyanide destruction, analytical control. Photographs, table. (A8, L17)

135-A. Safety Precautions With Grinding Wheels. H. Allen. *Product Finishing,* v. 8, Aug. 1955, p. 78-79.
Precautionary measures that should be adopted to make the use of grinding wheels safe. (A7, G18)

136-A. Expansion of World Tinplate Potential. W. E. Hoare. *Times Review of Industry,* v. 9, new ser., Aug. 1955, p. 26-27.
Plans and installations which almost double the 1939 tinplate output. Photographs, table. (A4, Sn)

137-A. Steel Mill and Coke By-Product Wastes. W. W. Hodge. Paper from "Fifteenth Annual Water Conference, Proceedings". Engineer's Society of Western Pennsylvania, p. 33-48.
Types of wastes, treatment and disposal problems. 35 ref.
(A8, D general, ST)

138-A. Metal Finishing Wastes. H. W. McElhaney. Paper from "Fifteenth Annual Water Conference, Proceedings". Engineer's Society of Western Pennsylvania, p. 63-64; disc., p. 64-66.

Methods and equipment used in treatment and disposal at Talon, Inc. plant. (A8, L general)

139-A. Factors Entering Into the Selection of a Water Treating Facility for a Large Mid-Western Steel Mill. T. L. Pankey and H. F. Hansell. Paper from "Fifteenth Annual Water Conference, Proceedings". Engineer's Society of Western Pennsylvania, p. 151-160; disc., p. 161-164.

Treatment of water for use in boilers, coke oven operations and cooling systems. Tables, diagrams, photographs. (A5, ST)

140-A. (German.) **Generation and Application of Extremely High Temperatures.** W. Lochte-Holtgreven. *VDI Zeitschrift,* v. 97, no. 23, Aug. 11, 1955, p. 785-788.

Attainable temperatures with solar, gas and electric-arc furnaces. Uses of high temperatures in industry and science. 23 ref. (A general)

141-A. (German.) **Research in the Field of Nonferrous Metals.** P. Brenner. *VDI Zeitschrift,* v. 97, no. 23, Aug. 11, 1955, p. 807-810; disc., p. 810-812.

Germany's problems of doing research on nonferrous metals. (A9)

142-A. The Foundry Industry in Australia. A. W. Silvester. *Foundry Trade Journal,* v. 99, Aug. 18, 1955, p. 167-176.

Economic survey of current activities and probable future developments. Tables, graph, photographs, map. 13 ref. (To be continued.) (A4, E general)

143-A. Reduced Turbulence Boosts Dust Collector Efficiency. C. A. Gallear. *Iron Age,* v. 176, Sept. 1, 1955, p. 98-100.

Claims savings of $1500 monthly with 92.5% over-all efficiency from this new design. Costs consist mainly of operating the 1000-hp. fan motor. Diagram, photographs. (A5, B16, Fe)

144-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 22, Aug. 1955, p. 343-350.

From "radioactive isotopes" to "Redruthite". Diagrams, tables, graphs. (To be continued.) (A10)

145-A. (English.) **Temple Steelworks at St.-Michel-De-Maurienne.** *Aciers Fins & Spéciaux Francais,* 1955, no. 20, July, p. 88-90.

Historical background, plant and production, types of material produced, application of special steels. Photographs. (A5, D general, ST)

146-A. (German.) **Extraction of Zinc From Blast Furnace Gas Filter Dust.** Hans Zieler. *Stahl und Eisen,* v. 75, no. 15, July 28, 1955, p. 975-978.

Thermal method of extraction in which a coke-iron mixture, removed in the process, is returned to the furnace. Method outlined for pelletizing the flue dust. Photograph, graph, diagrams. 3 ref. (A8, B16, Zn)

147-A. (Spanish.) **Medical Problems Posed by the Welding Profession and General Ways of Solving Them.** J. Dantin Gallego. *Ciencia y técnica de la Soldadura,* v. 5, no. 24, May-June 1955, 6 p.

Investigation for improving personal hygiene and working methods. Photographs. 16 ref. (A7, K general)

148-A. (Book.) **Encyclopedia of Chemical Technology.** Raymond E. Kirk and Donald F. Othmer, editors. v. XIV. *Thermodynamics to Waterproofing.* 980 p. 1955. Interscience Encyclopedia, Inc., 250 Fifth Ave., New York 1, N. Y.

Covers subjects from thermodynamics through waterproofing including headings of metallurgical interest. (A10)

149-A. (Book.) **Fifteenth Annual Water Conference, Proceedings.** 214 p. 1954. Engineer's Society of Western Pennsylvania, Pittsburgh, Pa.

Papers cover corrosion by water, and water supply, resources, purification, and treatment. Pertinent papers are individually abstracted. (A8, R4)

150-A. (Book.) **Production Handbook.** L. P. Alford and John R. Bangs, editors. 1676 p. 1954. The Ronald Press Co., 15 E. 26th St., New York.

Problems involved in directing men, materials, and machines of a manufacturing establishment; planning and control of effective production, time schedules, and budget and cost requirements. (A6)

B

Raw Materials and Ore Preparation

152-B. The Orthosilicate-Iron Oxide Portion of the System CaO-"FeO"-SiO_2. W. C. Allen and R. B. Snow. *American Ceramic Society, Journal,* v. 38, Aug. 1955, p. 264-280.

Phase equilibrium diagram determined for the liquidus surface of the portion of the system between fayalite, dicalcium silicate, wüstite and lime. Equilibria involving tricalcium silicate explain earlier observations on openhearth slags and furnace bottom refractories. Graphs, micrographs, diagrams, tables. 24 ref. (B21, M24)

153-B. The Production of Zirconium Chloride From Australian Zircon Sands. I. E. Newnham, Eleanor Rutherford and A. G. Turnbull. *Australian Journal of Applied Science,* v. 6, June 1955, p. 218-223.

Based on the Kroll process, setup is designed for small pilot plants; major components are a carbon tube resistor furnace and a Monel metal chlorinator. Graph, diagrams. 6 ref. (B14, Zr)

154-B. The Sedimentation of Suspensions of Spheres. R. L. Whitmore. *British Journal of Applied Physics,* v. 6, July 1955, p. 239-245.

Theoretical relationship between concentration and settling rate of solid, undeformable particles falling in a fluid. Micrographs, diagram, tables, graphs. 18 ref. (B14)

155-B. Flotation Tests on an Oxidized Lead-Zinc Ore From the Coeur D'Alene District, Idaho. Lewis S. Prater. *Idaho Bureau of Mines and Geology, Pamphlet No.* 104, July 1955, 12 p. + 3 plates.

Testing procedures and results. Extremely fine grinding would be necessary to liberate the minerals. Tables, micrographs. (B14, B13, Pb, Zn)

156-B. Recent Progress in the Design and Operation of Gold Reduction Plants. H. Britten. *South African Mining and Engineering Journal,* v. 66, pt. 1, July 9, 1955, p. 779 + 4 pages.

Sorting and crushing, sorting and disposal of wastes, ore storage, milling, concentration, recording instruments, product testing. 5 ref. (B13, B14, Au)

157-B. (German.) **Ore Beneficiation, Reduction, and Processing of Lead.** G. Heuser. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 675-682.

Elaborates on possible methods of treatment at the various steps of the operations. 7 ref. (B14, C general, Pb)

158-B. (Japanese.) **Studies on the Beneficiation of Domestic Manganese Ores.** Yuji Yamamoto, Tooru Ishihara, Tadaya Hoshino, Kenji Tomita, Hisanao Koizumi, Yasumichi Kagami and Kotaro Suzuki. *Resources Research Institute, Report, (Japan),* 1955, no. 24, June, 41 p.

Study to determine how much domestic ore, especially manganese carbonates and oxides, can be beneficiated by such processes as jigging, tabling and flotation. Tables, micrographs, graphs, photographs, diagrams. 92 ref. (B14, Mg)

159-B. Marmora's Iron Goes to Market. C. Mamen. *Canadian Mining Journal,* v. 76, Aug. 1955, p. 43-48.

Equipment and operating procedures of plant for the concentrating and pelletizing of magnetite ore. Photographs, flowsheet. 2 ref. (B14, B16, Fe)

160-B. Agglomerating Iron Ore Concentrates. R. B. Cooke and Thomas E. Ban. *Chemical Engineering Progress,* v. 51, Aug. 1955, p. 364-368.

Development of pelletizing, factors influencing balling, specific surface, nature of additives. Tables, graphs. 10 ref. (B14, B16, Fe)

161-B. Heavy Density Flowsheets. R. H. Lowe. *Mining Congress Journal,* v. 41, Aug. 1955, p. 43-46.

Processes using galena and magnetic media. Photograph, flowsheets. (B14)

162-B. (German.) **Transportation of Suspensions in the Mechernich Ore Beneficiating Plant.** Franz Zrenner. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 8, no. 8, Aug. 1955, p. 359-367.

Characteristics, wear resistance, operating costs of pumps used for moving ore slurries. Tables, diagrams, photographs, graph. 7 ref. (B14)

163-B. Some Contributions of Chemistry to the Winning of Metals. E. L. Day. *Chemistry & Industry,* 1955, no. 31, July 30, p. 960-967.

Advances in ore location, ore dressing and extractive metallurgy as applied to gold, nickel, uranium, the platinum metals and other metals. Flowsheet. 3 ref. (B general, C general, Au, Ni, U, EG-c)

164-B. Fairless Works Achieves Close Control in Mixing Fuel Gases. Jack E. Webber. *Gas,* v. 31, Sept. 1955, p. 46-51.

Design at Fairless Works for maintaining a fixed heat flow factor with natural gas, plant-generated coke-oven gas and air in face of a variable demand. Table, graph, diagrams. (B18, A5, ST)

165-B. Grevor Mine. *Mine & Quarry Engineering,* v. 21, Sept. 1955, p. 366-376.

Concentration plant including crushing, washing, gravity concentration, table flotation, concentrate retreatment and slimes plant. Photographs, flowsheets. (B13, B14, Sn)

166-B. (Book.) **Symposium on Sinter.** Special Report No. 53. 200 p. 1955. Iron and Steel Institute, 4 Grosvenor Gardens, London, S.W. 1, England.

Seventeen papers covering the physics and chemistry occurring in

a sinter bed, means of increasing the productivity of sinter plants, and the influence of sinter on economy of iron production in the blast furnace. Papers previously abstracted from preprints. (B16, D1, Fe)

C

Nonferrous Extraction and Refining

134-C. The Production of Ductile Electrolytic Chromium. H. T. Greenaway. *Commonwealth of Australia, Dept. of Supply, Research and Development Branch,* A.R.L./MET 6, Dec. 1954, 24 p. + 4 plates.
Production of electrolytic chrominum containing 0.01-0.02% oxygen and 0.002% nitrogen as its major impurities, and a hydrogen reduction technique for reducing these values to below the chemically detectable amounts; i.e., 0.005% and 0.001% respectively. Tables, graph, photograph, diagram, micrograph. 13 ref. (C23, Cr)

135-C. Titanium. I. W. J. Kroll. *Metal Industry,* v. 87, July 22, 1955, p. 63-66.
History, ores and refining of titanium. Diagram, photographs. 28 ref. (To be continued.)
C general, B general, Ti)

136-C. Titanium. II. W. J. Kroll. *Metal Industry,* v. 87, July 29, 1955, p. 83-86.
Fluoride reduction, iodide dissociation process, fusion electrolysis and soluble anode processes. 25 ref. (To be continued.)
(C4, C23, C26, Ti)

137-C. (French.) **Utilization of Vacuum in Metallurgy.** J. A. Stohr. *Vide,* v. 10, no. 57, May-June 1955, p. 64-70.
Methods, equipment, fields of application, advantages and disadvantages. Table, diagram, graphs, photographs. (C25, D8, Cu)

138-C. (Italian.) **Using the Spectrograph to Control an Industrial Production of Electrolytic Zinc and By-Products.** G. Scacciati and A. D'Este. *Metallurgia italiana,* v. 47, no. 6, June 1955, p. 259-265.
Advantages and limitations in applying the spectrograph to control silver, bismuth, indium, thallium, germanium, tin, antimony, molybdenum, arsenic and gallium in zinc and cadmium production. Tables. 14 ref. (C23, S11, Zn, Cd)

139-C. Ultra-Pure Solids for Electronics. Max M. Gransden. *Canadian Metals,* v. 18, Aug. 1955, p. 26, 28-29.
Utilization of semiconductors and metallurgical techniques in their refinement; zone refining. Graph, photographs. 4 ref. (C5, Ge, Si)

140-C. Refractories for the Copper Industry. *Ceramics,* v. 7, July 1955, p. 200-206.
Requirements for refining and smelting furnaces. Types used in the hearth, bottom and roof. Diagrams, photographs. 4 ref.
(C21, B19, Cu)

141-C. Some Aspects of the Chemical Processes Ancillary to Atomic Energy. The Manufacture of Uranium Metal From Ore. Christopher Hinton. *Institution of Chemical Engineers, Transactions,* v. 33, no. 1, 1955, p. 45-51.
Processes involved in the manufacture of pure uranium for use in atomic piles. (C general, U)

142-C. Zone Refining of Titanium. *Light Metal Age,* v. 13, Aug. 1955, p. 19.
Process, called cage-zone refining, uses a unique method to melt a bar of metal while the metal acts as its own crucible, thus preventing contamination by any containing vessel. Object of the process is to prepare a super-pure metal. Photograph. (C5, Ti)

143-C. Behavior of Titanium Dioxide on Heating and Toward Ferric Oxide, Sodium Oxide, and Magnesia. E. Junker. *Henry Brutcher Translation No.* 3547, 14 p. (Abridged from *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 228, no. 2, 1936, p. 97-111.) Henry Brutcher, Altadena, Calif.
Experiments conducted on titanium dioxide and mixtures of it with other oxides in order to obtain more information on titanium-containing slags. Graphs, diagrams. 31 ref. (C21, Ti)

144-C. Theory of the Electrolytic Production of Aluminum. I-II. E. Bonnier. *Henry Brutcher Translation Nos.* 3563-3564, 38 p. (From *Bulletin de la Société Chimique de France,* 1954, no. 1, p. 1D-11D) Henry Brutcher, Altadena, Calif.
Study of state of dissociation in the cryolite-bath electrolysis of alumina; nature of the ions; existence of AlO_2 or AlO; dissociation in alkaline baths and acid baths. Measurements of polarization, decomposition and individual electrode potentials. 85 ref. (C23, Al)

145-C. Purification of Silicon. Henry C. Theuerer. *Bell Laboratories Record,* v. 33, Sept. 1955, p. 327-330.
Methods of preparing silicon for use in research and development purposes. Photographs, diagram.
(C21, Si)

146-C. Methods of Separating Zirconium From Hafnium and Their Technological Implications. F. Hudswell and J. M. Hutcheon. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8P-/409, July 1955, 20 p.
Since hafnium occurs naturally with zirconium and since its presence produces undesirable properties, several processes were devised to obtain pure zirconium. Tables, photograph, diagrams, graphs, flowsheets. 13 ref.
(C28, Hf, Zr)

147-C. Titanium. W. J. Kroll. *Metal Industry,* v. 87, Aug. 5, 1955, p. 105-108; Aug. 12, 1955, p. 130-134; Aug. 19, 1955, p. 147-149; Aug. 26, 1955, p. 173-174.
Magnesium reduction of titanium tetrachloride and treatment of the reduced sponge; ingot melting and casting; mechanical properties. Diagrams, photographs. 88 ref.
(C26, C4, C5, Q general, Ti)

148-C. (French.) **Production of Germanium Alloys With Nickel, Iron, and Manganese by Fused Electrolysis.** Marie - Jeanne Barbier - Andrieux. *Comptes rendus,* v. 241, no. 3, July 18, 1955, p. 309-311.
Equipment and operating procedures. Tables. 8 ref. (C23, Ge)

D

Ferrous Reduction and Refining

299-D. Life of Ingot Moulds: Condition of Service, Mould Material and Design, and Metal Composition. *Foundry Trade Journal,* v. 99, July 28, 1955, p. 101-102.
Results and conclusions of extensive studies of mold performance with the aim towards reducing their consumption. Graph, table. (D9)

300-D. Speeding Open Hearth Charging. M. D. J. Brisby and W. O. Pendray. *Iron & Steel,* v. 28, Aug. 1955, p. 403-404.
Common causes of slowed charging time and how efficiency can be increased without cost. Graphs. 1 ref. (D2)

301-D. Application of Continuous Casting to Steel. J. Savage. *Metal Treatment and Drop Forging,* v. 22, July 1955, p. 277-287.
Application in 11 plants operating on wide range of steels and differences between the three principal processes as concerns billet skin rupture. Outlines automatic controls. Graphs, diagrams. 17 ref.
(D9, ST)

302-D. Let's Make Basic Steel. John P. Holt. *Modern Castings and American Foundryman,* v. 28, Aug. 1955, p. 33-37.
Problems involved and reasons for changing from acid to basic steelmaking. Photographs, table. 7 ref. (D5, ST)

303-D. (Czech.) **The Oxidation Period in Basic Electric Arc-Furnaces.** Premysl Fremunt and Pavel Pant. *Slévarenstvi,* v. 3, no. 7, July 1955, p. 202-207.
Methods of lowering the phosphorus content in the steel by regulating charge temperature of the slag composition. Effect of various methods of predeoxidizing steel on the number of nonmetallic inclusions. Tables, graphs. 7 ref.
(D5, ST)

304-D. (French.) **Pre-Refining of Melt in Ladle by Means of Pure Oxygen. Results Obtained in a Pilot-Plant.** P. Leroy and L. Septier. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 7, 1955, p. 1383-1402.
Oxygen, blown into a full ladle by a vertical injector, proves to be a simple and effective means of desiliconizing the pig iron. Graphs, photographs, tables, diagrams. 6 ref. (D general, ST)

305-D. (French.) **Additional Information on the Problem of Bricks for Gates in Steel Casting.** L. Halm. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 7, 1955, p. 1403-1423.
Analysis of factors inducing the wear of the gate bricks, such as steel composition, pouring temperature, ladle capacity, and time of pouring operation; characteristics of the gate bricks; optimum composition depending on the prevailing conditions. Tables, graphs, photographs, micrographs. 3 ref.
(D9, F22, ST)

306-D. (French.) **Silico-Alumina Refractories for Open-Hearth Furnaces. Standardization of Dimensions. Physico-Chemical Characteristics.** M. Savarre. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 7, 1955, p. 1425-1432.
Different types of refractories; necessity of standardization of dimensions and composition of bricks for individual purposes (furnace, gate and ladle); influence of types of refractories on the cost of steel production. Tables, diagram.
(D2, ST)

307-D. (German.) **The Relations Between Blast Furnace Operation and Pig Iron Quality and Their Effect on the Quality of the Basic Converter Steel.** Walter Hummel, Walter Loorz

and Willy Oelsen. *Stahl und Eisen*, v. 75, no. 14, July 14, 1955, p. 885-900.

Observations made when tapping; effects of the flow of gases and of the burdening conditions on the characteristic data; degree of pig iron reduction and quality of the basic converter steel. Diagrams, graphs, tables. 13 ref. (D1, D3, ST)

308-D. (German.) **Measures to Be Taken for Improving the Life of Slag Ladles.** Eugen Betting. *Stahl und Eisen*, v. 75, no. 14, July 14, 1955, p. 906-911.

Relations between stresses sustained by the ladle material, effect of heat, structural design of parts, impact loads in operation. Conclusions for the design of the ladle support and ladle wall, and for choice of material. Table, diagrams, graphs, photographs. 1 ref. (D9, B21)

309-D. Use of Mould Dressings in Steelmaking. D. R. Thornton. *British Steelmaker*, v. 21, Aug. 1955, p. 252-257.

Use of dressings on the inner surface of the mold to extend the permissible range of values of teeming speed and temperature without detrimental effects on surface quality. Diagrams, graphs. 8 ref. (D9, ST)

310-D. Hydraulic Systems on Charging Machines and Manipulators. R. S. Bogar. *Iron and Steel Engineer*, v. 32, Aug. 1955, p. 57-68; disc., p. 68-69.

Features of hydraulic systems on steel plant charging equipment, need for regular inspection, periodic adjustments, regularly scheduled tests by operating personnel. Diagrams. (D2, ST)

311-D. Some Aspects of Open Hearth Waste Gas Analysis Control. F. P. Hubbell. *Iron and Steel Engineer*, v. 32, Aug. 1955, p. 85-88; disc., p. 88-89.

Application to one furnace in a shop where operation of a number of furnaces are essentially alike, use of information to regulate practice and schedules of all furnace units. Photographs. (D2, S11)

312-D. Erection and Operation of Blast Furnaces in Chile. Thomas W. Plante. *Iron and Steel Engineer*, v. 32, Aug. 1955, p. 143-149.

Use of American skill and ingenuity in overcoming local problems such as training of unskilled personnel, climatic conditions, raw materials and distance from sources of supply. Photographs. (D1, B10)

313-D. Results of One Year's Researches on the Low-Shaft Furnace. I. *Henry Brutcher Translation No.* 3561, 21 p. (From *Revue Universelle des Mines*, v. 98, ser. 9, no. 2, 1955, p. 45-58.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 163-D, 1955. (D1)

314-D. (Czech.) **Experiments in the Use of Oxygen in Converters in the Conversion of Bessemer Pig Iron.** Vladimir Chvatal. *Hutnik*, v. 5, no. 6, June 1955, p. 162-165.

Czech experiments in steelmaking. Comparison of strength of standard Bessemer steel, Bessemer steel with oxygen addition, and standard openhearth steel. Graphs, table. (D3, ST)

315-D. (Czech.) **Contribution to Pig Iron-Ore Process Technology.** Alex. Dekanovsky. *Hutnické Listy*, v. 10, no. 7, July 1955, p. 403-408.

Influence of temperature and composition of liquid pig iron on the output of stationary and tilting openhearth furnaces. Tables, graphs. 8 ref. (D2, Fe)

316-D. (French.) **Combustion (Gas) Turbine. Characteristics and Results of Exploitation, Particularly in Metallurgical Works.** M. Widmer. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 12, no. 8, 1955, p. 1593-1616.

Description of existing types. Utilization of gas from blast furnaces as fuel. Examples of applications. Tables, diagrams, graphs, photographs. (D1)

317-D. (French.) **Recent Progress in the Field of Gas Turbines Utilized in Steel Works.** M. Baumann. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques* v. 12, no. 8, 1955, p. 1617-1638; disc., p. 1638-1639.

Theoretical consideration, existing types, fields of application in metallurgy of steel. Graphs, diagrams. (D general)

318-D. (German.) **Results of the Investigation on Blast Furnace Hot Blast Stoves.** Karl Kessels. *Stahl und Eisen*, v. 75, no. 15, July 28, 1955, p. 958-974.

Conditions of the tests, heat balance and efficiency, heat load, heat transfer power, measuring equipment. Tables, graphs, diagrams. 10 ref. (D1)

319-D. Trends in German Silica Bricks for O.H.-Roofs. K. Konopicky. *Refractories Journal*, v. 31, Aug. 1955, p. 457-464; disc., p. 464-465.

Behavior and disentegration of bricks in actual service compared to chromatography. Graphs, tables. (D2, ST)

320-D. (German.) **Open-Hearth Steel Produced From Basic Bessemer Pig Iron Rich in Phosphorus.** Willy Oelsen and Heinz Voigt. *Stahl und Eisen*, v. 75, no. 16, Aug. 11, 1955, p. 1013-1024.

Comparison of pig iron and ore process with conventional basic bessemer process. Slag composition, particularly its content of phosphorus pentoxide soluble in citric acid. Tables, graphs, photograph, diagrams. 16 ref. (D2, D3, CI, ST)

321-D. (German.) **Desulfurization of Pig Iron in the Electric Smelting Furnace.** Borut Marincek. *Stahl und Eisen*, v. 75, no. 16, Aug. 11, 1955, p. 1024-1026.

Sulfur content is dependent on the basicity of the slag and on saturation of the pig iron with carbon. Tables, graphs. (D6, Fe)

322-D. (German.) **Experiences With Hot Blast Valves of a Simplified Type of Design.** Willi Dehne. *Stahl und Eisen*, v. 75, no. 16, Aug. 11, 1955, p. 1027-1029.

Behavior of the rammed refractory lining and advantages of the flangeless design. Diagram, photographs. 1 ref. (D general)

E

Foundry

336-E. On Various Theories of Globular Graphite Formation in Cast Iron. Ichiro Iitaka. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 1-5.

Critical review and comparison of surface tension, supersaturation, and other theories. Diagrams. 22 ref. (E10, E25, CI)

337-E. The Effect of Inoculation in Nodular Cast Iron. Ichiro Iitaka and Kokichi Nakamura. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 9-11.

Effects of variation in inoculating time and interval on microstructure. Micrographs. 4 ref. (E25, M27, CI)

338-E. The Effects of Mo, Ni:Mo and Cu:Mo Additions on the Matrix of Spheroidal Graphite Cast Iron. Takaji Kusakawa. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 15-20.

Effects of melt additives on microstructure and hardness. Tables, graphs, micrographs. (E25, M27, Q29, CI)

339-E. Method to Determine the Semblance of a Molding Sand Grain. Jiro Kashima. *Casting Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 31-37.

Procedure for measuring specific surface area of sands, using ethylene glycol or glycerine. Tables, graphs, diagram. (E18)

340-E. Long-Length and Bi-Metal Centrifugal Castings. *Engineering*, v. 180, July 22, 1955, p. 112-113.

Controlled coatings on metal molds, mold preparation, casting and stripping methods. Photographs. (E14, Fe, ST)

341-E. Metal and Mould Research on Steel Castings. II. Mould and Core-Bonding Agents. J. M. Middleton and J. White. *Foundry Trade Journal*, v. 99, July 21, 1955, p. 59-70, 82.

Bonding properties and a "life" index of numerous bentonites and several British kaolinitic clays show that mixtures have certain advantages. Dielectric-cured and oven-baked resin-bonded cores evaluated. Hot tearing in steel castings related to extent of ramming. Tables, graphs, diagram, photographs. 6 ref. (E18, E21, ST)

342-E. Evaluation of Casting Processes. Hiram Brown. *Foundry Trade Journal*, v. 99, July 28, 1955, p. 85-92.

Superiority of castings for many applications, advantages and limitations of the various foundry methods. Photographs. 4 ref. (E general, T general)

343-E. Precision Casting Simplifies Production of Stainless Pump Impeller. Eric Anderson and E. H. Parris. *Iron Age*, v. 176, Aug. 18, 1955, p. 87-89.

Step-by-step description of process which avoids prohibitive machining costs. Photographs. (E15, G17, SS)

344-E. Formation of Shrinkage Defects in Grey Iron Castings. J. Gittus. *Iron & Steel*, v. 28, Aug. 1955, p. 387-390.

Formation of cavities in gray iron castings; effects of silicon, phosphorus and carbon; influence of type of mold. Graphs, diagrams, photographs. 1 ref. (E25, CI)

345-E. Pressure Die-Casting—A Recap. *Metal Industry*, v. 87, July 22, 1955, p. 71-72.

Costs and economics of die casting processes, difficulties of limited production. Diagrams, photographs. (E13)

346-E. They're Making Molds Out of Glass Now. Richard M. Smith and Nicholas J. Grant. *Modern Castings and American Foundryman*, v. 28, Aug. 1955, p. 30-32.

Process uses ceramic slip of crushed, almost pure silica glass to make shell molds for exceptionally smooth castings. Diagram, photographs. (E16)

347-E. How to Bake Cores Without Heat. Waldemar Schumacher.

Modern Castings and American Foundryman, v. 28, July 1955, p. 32-35.

Carbon dioxide blown through a water glass-sand mixture will bond them in minutes. Process details. Photographs, graphs. (E21)

348-E. Casting High Quality Magnesium. H. E. Elliott. *Modern Castings and American Foundryman,* v. 28, July 1955, p. 38-44.

Look at every phase of production and testing for better magnesium foundry practice. Photographs. (E general, Mg)

349-E. The Case of the Absorbed Oxygen. Robert C. Williams and Harold W. Lownie, Jr. *Modern Castings and American Foundryman,* v. 28, Aug. 1955, p. 58-59.

Results of recent discovery explaining why castings contain more oxygen than expected. Points out significance of the time elapsed between casting and analyzing the iron. Photograph, graph. 3 ref. (E25, S11, CI)

350-E. Smooth That Alligator Skin. Burdette Jones. *Modern Castings and American Foundryman,* v. 28, July 1955, p. 82-84.

Proper amount of foundry sand additives and binders results in smoother casting finish. Photographs. (E18)

351-E. Molding Materials, Methods and Machines. R. W. Heine and P. C. Rosenthal. *Modern Castings and American Foundryman,* v. 28, Aug. 1955, p. 39-54.

Advances in and evaluation of processes in methods, equipment and materials of molding. Photographs, tables, diagrams. (E19)

352-E. New Sugar Formula Makes Sweet Core Binder. Charles J. Gogek. *Modern Castings and American Foundryman,* v. 28, Aug. 1955, p. 55-57.

Results of laboratory tests and a brief discusssion of foundry trials. Photographs, tables, graphs. (E21)

353-E. Bronze Die Castings by Vacuum. *Precision Metal Molding,* v. 13, Aug. 1955, p. 34-36, 75.

Principle, advantages, alloys applicable to the process, design freedom. Table, diagram, photographs. (E13, Cu)

354-E. (Czech.) **Castings Produced by Shell Molding.** Lev Petrzela. *Slévarenstvi,* v. 3, no. 7, July 1955, p. 196-202.

Production methods, including molding techniques and testing. Photograph, diagrams, graphs. (E16)

355-E. (German.) **The Metallurgy of a High-Test Cast Iron With Compact to Spherical Graphite Structure.** Eugen Piwowarsky and Ernst-Günter Nickel. *Giesserei,* v. 42, no. 15, July 21, 1955, p. 385-392.

Production of high-strength cast iron by superheating, methods of deoxidizing, degassing and melting in basic-lined furnaces. Tables, micrographs, diagram, graph. 8 ref. (E10, E25, CI)

356-E. (Italian.) **Production of Cast Iron With Nodular Graphite.** R. Zoia and A. Masi. *Fonderia,* v. 4, no. 5, May 1955, p. 215-219.

Production and composition of nodular graphite cast iron. Table, graph, micrographs. 12 ref. (E25, CI)

357-E. (Italian.) **Functional Curve of a Cupola Furnace.** J. N. Alcacer and J. A. J. de Andrés. *Fonderia,* v. 4, no. 6, June 1955, p. 249-253.

Theory of operation. Diagrams, tables, graphs. 4 ref. (E10)

358-E. Shell Moulding Gains Over Sand. *Canadian Metals,* v. 18, Aug. 1955, p. 33-34, 36.

Process of coating hot pattern with resin bonded sand in a dump box shows promising economies in production. Photographs. (E16)

359-E. Production Layout for the Small Jobbing Foundry. Frank Hudson. *Canadian Metals,* v. 18, Aug. 1955, p. 38-40.

Economies of production in the small jobbing foundry which can cut costs without heavy expense of new equipment. Photographs. (E general)

360-E. Chevrolet Tonawanda Foundry. *Foundry,* v. 83, Sept. 1955, p. 112-142.

Photographic tour of 280,000-sq.ft. plant covering sand storage, coremaking, molding, melting, cleaning, patternmaking and maintenance shops. Photographs, plans. (E general, A5, CI)

361-E. Automatic Casting of Aluminum Employs Continuous Melting. Jack C. Miske. *Foundry,* v. 83, Sept. 1955, p. 143-147.

New type of furnace can be heated up in less than 3 hr., melts ingots in 24 to 30 min., and provides continuous supply of metal. Diagram, photographs. (E10, Al)

362-E. Selecting Ingot and Scrap in the Brass Foundry. Harry St. John. *Foundry,* v. 83, Sept. 1955, p. 154-157.

Economies of maintianing a clean plant means recovery and utilization of high-quality scrap. Table, diagram, photograph. (To be continued.) (E general, A8, Cu)

363-E. Production and Quality Raised by Automated Sand System. I. H. Richardson. *Foundry,* v. 83, Sept. 1955, p. 158-161.

Automated sand formulation, processing, handling and distributing system resulted in upgrading of castings. Diagram, photographs. (E18)

364-E. Behaviour of Moulding Sands at High Temperatures. W. B. Parkes and R. G. Godding. *Foundry Trade Journal,* v. 99, Aug. 11, 1955, p. 139-149.

Measurements of stress-strain properties and brittleness of sand on heating to 2000° C. in approximately 2 min. Diagrams, graphs, photographs, table. 10 ref. (E18)

365-E. Quantity Production of Magnesium Castings. W. J. Sully. *Metal Industry,* v. 87, Aug. 12, 1955, p. 125-127.

Use of magnesium alloy in casting of tractor transmission cases. Tables, photographs. (E11, T21, Mg)

366-E. Sodium Waterglass as a Binder for Foundry Molds. A. Potocki. *Henry Brutcher Translation No.* 3455, 4 p. (Abstract from *Przeglad Odlewnictwa,* 1953, no. 7, p. 13-14.) Henry Brutcher, Altadena, Calif.

Laboratory and semiproduction experiments in steel-casting foundry. Three forms of hardening were tried: short period baking in an electric oven without air circulation; action of an atmosphere of carbon dioxide in an open vessel; injection of carbon dioxide from a gas bottle. 1 ref. (E19, CI)

367-E. (German.) **Melting Chips in the Cupola Furnace According to the Crofts Process.** S. H. Chrobok. *Giesserei,* v. 42, no. 16, Aug. 4, 1955, p. 409-412.

Economy, method of charging and conditions of melting cast iron, steel and malleable iron chips in the cupola furnace; carbon, sulfur, silicon and manganese analysis of melts made with and without chips indicate no significant effect of chips on the composition of a casting. Tables, photographs, diagram. 2 ref. (E10, CI, ST)

368-E. (German.) **The Metallurgy of a High-Test Cast Iron With Compact to Spheroid Graphite Structure.** Eugen Piwowarsky and Ernst-Günter Nickel. *Giesserei,* v. 42, no. 16, Aug. 4, 1955, p. 412-419.

Mechanical properties of gray iron are increased by reducing the gas content of a melt to a minimum. Effect of basic and acid melting and of superheating beyond 1600° C.; strength properties resulting from treating melts with scavenging gas and high-vacuum melting; effect of fluoride mixtures on graphite structure. Micrographs, tables, diagram, graph, photograph. 30 ref. (E25, M27, CI)

369-E. (German.) **The Combustion Process in the Cupola Furnace.** Wolfgang von Preen. *Giesserei,* v. 42, no. 16, Aug. 4, 1955, p. 419-420.

Experimental studies on the combustion of coke to form carbon monoxide before forming carbon dioxide and reduction of carbon dioxide due to insufficiency of oxygen. 8 ref. (E10)

370-E. (German.) **Mutual Effect Between Steel and the Mold.** Werner Trommer. *Giesserei,* v. 42, no. 17, Aug. 18, 1955, p. 433-440.

Effect of drying and temperature rates on compression strength of molding sands. Effect of type, grain size distribution and properties of molding sand and gas permeability of mold on shell formation on casting, fusion of casting to mold, formation of sand spots, composition of steel, condition of casting. Graphs, photographs, diagrams, micrograph. 34 ref. (E18, E19, CI)

371-E. (Russian.) **Particularities of the Production of Thin Wall Chill Mold Castings.** A. M. Petrichenko. *Liteinoe Proizvodstvo,* 1955, no. 7, July, p. 4-8.

Particularities of crystallization. Construction of chill molds; pouring installation. Diagrams, graphs, tables, micrographs. 5 ref. (E25, CI)

372-E. (Russian.) **Changes in Chemical Composition and Temperature of Metal During Oxygen Blowing Through Cast Iron in the Forehearth of a Cupola Furnace.** N. A. Voronova and O. A. Trigub. *Liteinoe Proizvodstvo,* 1955, no. 7, July, p. 17-20.

Effects of operating conditions on composition. Tables, graphs. 6 ref. (E10, CI)

373-E. Metal Melting Furnaces. F. C. Evans. *Foundry Trade Journal,* v. 99, Aug. 18, 1955, p. 177-178; disc., p. 178-180.

Metallurgical, economic and practical aspects based on fuel characteristics. Table, diagrams. (E10, B18)

374-E. Chill Testing. A. P. Alexander. *Foundry Trade Journal,* v. 99, Aug. 18, 1955, p. 181-182.

This rapid means for determining carbide stability of cast iron is used to check on melting operations and to control the structure of the castings. Table, graph. (E25, CI)

375-E. The Foundry Industry in Australia. A. W. Silvester. *Foundry Trade Journal,* v. 99, Aug. 25, 1955, p. 203-210.

Available molding sands, refractories and fluxes, types of foundries, production and capacity, equipment and control, molding practices,

research and development and the future of Australia's secondary industry. Tables, photographs. 5 ref. (E general, A4)

376-E. Radiant Heat Furnace Feeds Metal Molds. John J. Keating. *Modern Castings and American Foundryman,* v. 28, Sept. 1955, p. 30-31.

Advantages of continuous melting method include better quality, reduction of wasteful heating and solution to summer problems. Photographs, diagram. (E10, Al)

377-E. Make Small Risers Do the Work of Large. William A. Mader. *Modern Castings and American Foundryman,* v. 28, Sept. 1955, p. 32-35.

Insulating and exothermic risering and padding materials can give higher yield and better quality in sand casting of aluminum. Photographs, table, graph. 10 ref. (E22, Al)

378-E. Core Room Pitfalls. Robert H. Greenlee. *Modern Castings and American Foundryman,* v. 28, Sept. 1955, p. 36-37.

Problems in producing cores that aid in making better castings and not merely overcoming core room problems. Photographs. (E21)

379-E. What You Should Know About Forehearth Refractories. Ralph Carlson and Sam F. Carter. *Modern Castings and American Foundryman,* v. 28, Sept. 1955, p. 56-60.

Use of clay plastic containing graphite has proven most suitable for forehearth soda ash desulfurizing of gray iron. Photographs, tables, diagrams. (E10, CI)

380-E. Investment Casting of Carbon Steels. Howard Derow. *Steel,* v. 137, Aug. 22, 1955, p. 70-71.

Castability, surface decarburization, heat treatment, grain size, machining and hardness of investment castings. Photographs. (E15, CI)

381-E. (German.) **Determination of the Volume of Blast Actually Supplied to a Cupola Furnace.** Alois Dahlmann. *Giesserei,* v. 42, no. 17, Aug. 18, 1955, p. 440-442.

Methods of converting volume of blast to standard conditions and computing consumption and losses of blast in the furnace. Graphs. (E10)

F

Primary Mechanical Working

191-F. Measurement of the Pressure Distribution Between Rollers in Contact. G. J. Parish. *British Journal of Applied Physics,* v. 6, July 1955, p. 256-261.

Measurement of processes in which there is no fixed gap between rollers at low roll pressures. Diagrams, graphs, table. 4 ref. (F23)

192-F. Lead Extrusion at Various Speeds. Yuji Matsuura. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 65-68.

Effects of die angles, and reductions and extrusion rates on extrusion pressures. Graphs, photographs. (F24, Pb)

193-F. Surface Friction and Lubrication in Cold Strip Rolling. P. W. Whitton and Hugh Ford. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 5, 1955, p. 123-133 + 2 plates; disc., p. 133-140.

Method of measuring friction in the roll gap under the conditions of the cold rolling process without making use of any theory of the distribution of roll pressure along the contact arc. Method and the friction coefficients so found used to compare calculated and measured values of roll force and torque. Diagram, tables, graphs, photographs, micrographs. 31 ref. (F23, F1, Q9, ST)

194-F. New Steel Tube and Pipe Mill Offers Variety of Specialty Products. P. M. Unterweiser. *Iron Age,* v. 176, Aug. 18, 1955, p. 75-78.

Calmes process, which provides an efficient means for piercing and elongating preheated ingots, is adaptable to both alloy and plain carbon steels and still produces remarkably tight wall tolerance and concentricity in an unusual range of sizes. Photographs, flowsheet. (F26, ST)

195-F. Manufacture of Drop Forgings in the Motor Industry. *Metal Treatment and Drop Forging,* v. 22, July 1955, p. 299-305.

Description of various divisions—die design and manufacture, material supply, various forms of forging plant, together with main ancillaries, heat treatment, cleaning, inspection and metallurgical control. Photographs, diagram. (To be continued.) (F22)

196-F. New Non-Scaling Gas-Fired Forge Furnace. *Metal Treatment and Drop Forging,* v. 22, July 1955, p. 306-308.

"Equiverse" system depends on a high CO content, hot (above 1000° C.) air atmosphere in the furnace. Design gives waste-gas temperature less than 200° C. Photographs, micrographs. (F21)

197-F. Aluminum Extrusions—From the Heavy Press Program. A. L. Hurst. *Product Engineering,* v. 26, Aug. 1955, p. 150-153.

Limitations in die design, production considerations, tolerances obtainable and applicable alloys, based on parts already produced by this equipment. Photographs, tables. (F24, Al)

198-F. (French.) **Problems of Manufacture and of Ultrasonic Examination of Heavy Press Forgings.** C. Roques, Ch. Dubois and P. Bastien. *Revue de métallurgie,* v. 52, no. 5, May 1955, p. 353-368.

Nature and cause of cracks in press forgings; influence of heterogeneities and metallurgical quality of the steel; problems of ultrasonic examination and necessary precautions. Tables, graphs, micrographs, photographs, diagrams. 11 ref. (F22, S13)

199-F. Hot Scarfing With a Mechanical Bloom Turner. A. B. Glossbrenner. *Iron and Steel Engineer,* v. 32, Aug. 1955, p. 77-80; disc., p. 80-81.

Description of system, how it works and some of the planning and preparation that preceded the installation. Photographs. (F21)

200-F. The 11-In. Rod Mill at Jones and Laughlin's Aliquippa Plant. N. A. Hansen. *Iron and Steel Engineer,* v. 32, Aug. 1955, p. 90-93; disc., p. 94-95.

Rod mill designed for three-strand operation at speeds up to 6400 ft. per min. Diagrams, photographs. (F27)

201-F. A Study of Failures in Iron Work Rolls. Charles F. Peck, Jr., and Frederic T. Mavis. *Iron and Steel Engineer,* v. 32, Aug. 1955, p. 121-127; disc., p. 127-131.

Temperature stresses in a roll during operation. Spalling seems to be due to high radial stresses set up in the roll by temperature conditions. Graphs, diagrams, table, photograph. 4 ref. (F23, S21, ST)

202-F. Aluminum Wire Drawing. Roger J. Schoerner. *Wire and Wire Products,* v. 30, Aug. 1955, p. 883 + 5 pages.

Some of the over-all aluminum wiredrawing activities on a domestic and world-wide basis. (F28, Al)

203-F. Tungsten Carbide Die Design for Drawing Aluminum Rods and Wire. Edgar T. Miller. *Wire and Wire Products,* v. 30, Aug. 1955, p. 886-887.

Factors of importance in designing dies for the drawing of aluminum wire and rod. Diagrams. (F27, F28, Al, W)

204-F. Some Comments on Dry Drawing of Aluminum Wire. Chester F. Wickwire. *Wire and Wire Products,* v. 30, Aug. 1955, p. 889, 940.

Comments on adapting steel-type drawing machinery to aluminum alloy materials. Types of lubricants and modification of finishing blocks. (F28, F1, Al)

205-F. Filtration of Lubricants for Aluminum Wire Drawing. H. T. Jones, Jr. *Wire and Wire Products,* v. 30, Aug. 1955, p. 890-893, 941.

Design, operation, construction and cleaning of a pressure leaf filter used on mineral oil die lubricants. Photographs, diagrams. (F28, F1, Al)

206-F. Fine Wire. Elmer E. Bonds. *Wire and Wire Products,* v. 30, Aug. 1955, p. 897-898, 944.

Methods of manufacture, different types and finishes, applications. (F28)

207-F. (Czech.) **Reasons for Rejects in Drop Forging and Methods of Decreasing the Number of Rejects.** Rudolf Hrivnak. *Hutnik,* v. 5, no. 6, June 1955, p. 176-180.

Types of defects analyzed. Diagrams. (F22)

208-F. (French.) **Operation of Soaking Pits. Their Regulation.** M. Woll. *Flamme et thermique,* v. 8, no. 82, July 1955, p. 31-40.

Installations and recent improvements in their regulation. Diagrams, graphs. (F21)

209-F. (Hungarian.) **What to Do About Negative Tolerance?** Frigyes Arkos. *Kohaszati Lapok,* v. 10, no. 7, July 1955, p. 289-295.

Problems of tolerance in rolled steel production, factors determining range of tolerance including temperature and condition of the rolls. Diagrams, graphs. (F23, ST)

210-F. (Hungarian.) **Some Problems of Wire Drawing.** Lajos Mankher. *Kohaszati Lapok,* v. 10, no. 7, July 1955, p. 295-307 + 2 plates.

Factors effecting quality, optimum drawing conditions, conditions conducive to defects. Tables, graphs. 8 ref. (F28)

211-F. Manufacture of Drop Forgings in the Motor Industry. *Metal Treatment and Drop Forging,* v. 22, Aug. 1955, p. 351-357.

Review of manufacturing stages of a number of typical drop-forged components, with special reference to the Austin A30. Photographs, diagrams. 4 ref. (F22)

212-F. (English.) **Wire-Drawing Alloy Steels.** *Aciers Fins & Spéciaux Francais,* 1955, no. 20, July, p. 49-52.

Review of a limited number of the more characteristics applications of special steels as wires, rods and strips. Tables, photographs. (F28, AY)

213-F. (French.) **Forged and Stamped Parts of Aluminum Alloys.** V. Robert

Colomb. *Revue de l'aluminium*, v. 32, no. 222, June 1955, p. 627-641.

Examples of forged parts for compressors, engines and aircraft; processing details and properties of finished products. Photographs, diagrams, graphs, tables. (F22, G3, Al)

214-F. (French and German.) **Forging of the German Silver NS 50/7 Pb.** H. Bovet. *Pro-Metal,* v. 7, no. 45, June 1955, p. 516-519.

Effect of structure and temperature on the forging properties of German silver. Micrographs, photograph. (F22, Cu)

215-F. (German.) **Construction and Operation of Modern Forging Furnaces.** Karlheinz Niemeyer. *Stahl und Eisen,* v. 75, no. 16, Aug. 11, 1955, p. 1029-1035.

Features of forging furnace design, heating-up of forgings according to plan and desultory and plotting of characteristic curves for the determination of heating times and gas consumption. Tables, graphs, diagrams, photograph. 4 ref. (F22, F21)

216-F. (Russian.) **New Method of Testing the Plastic Properties of Metals at High Temperatures.** I. A. Fomichev. *Zavodskaia Laboratoriia,* v. 21, no. 7, July 1955, p. 841-844.

Tests to establish optimum temperature conditions for helical rolling (rotary piercing) of seamless steel tubing. Diagrams, graphs, photographs. (F26, Q24, ST)

217-F. (Book.) **Bibliography on the Rolling of Iron and Steel.** Bibliographical Series No. 15a. 75 p. 1955. Iron and Steel Institute, 4 Grosvenor Gardens, London, S.W. 1, England.

Work is divided into seven sections covering theory of deformation and mechanics of rolling, rolling mill practice, defects in rolled material, reconditioning of mill equipment, manufacture of seamless tubes, effect of rolling on the properties of iron and steel, and text books. (F23, ST)

G

Secondary Mechanical Working

244-G. **Underwater Miller Machines Nuclear Fuel.** S. L. Lindbeck. *American Machinist,* v. 99, Aug. 15, 1955, p. 110-111.

Water pit provides shielding, removes decay heat and suppresses spread of contamination in machining expended reactor fuel. Photographs. (G17, Pu, U)

245-G. **Shear-Plane Temperature Distribution in Orthogonal Cutting.** J. H. Weiner. *American Society of Mechanical Engineers, Paper* No. 54—A-65, 1954, 16 p. + 1 plate.

Analysis of the temperature distribution along the shear plane due to energy released in the shear deformation. Diagrams, graphs. 8 ref. (G17, Q24)

246-G. **Friction in the Sheet Drawing.** Hiroshi Yamanouchi and Ikuhiko Hayashi. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 58-60.

Measurements of die pressure and drawing force; influence of die shape; comparison of experimental data with theoretical values. Diagrams, graphs. (G4, Q9)

247-G. **The Cutting Mechanism of Brass Containing Lead.** Fusao Hayama. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 61-64.

Analysis of machinability by applying plasticity theory to cutting parameters. Graphs, diagram. (G17, Q24, Cu)

248-G. **Tools Last Longer, Jobs Machine Faster With Leaded Alloy Steels.** H. W. McQuaid. *Iron Age,* v. 176, Aug. 18, 1955, p. 84-86.

Spheroidal dispersed lead (0.15 to 0.35%) in steels permits up to 300% greater production rates and 200% increase in tool life. Table, photographs. (G17, AY)

249-G. **Impact (Cold) Extruded Parts.** John L. Everhart. *Materials & Methods,* v. 42, Aug. 1955, p. 111-126.

Describes impact extrusion process and discusses sizes, shapes, limitations and applications of parts produced from aluminum and aluminum alloys, steels, magnesium and magnesium alloys, and other nonferrous metals. Photographs, table, diagrams, graphs. (G5, Al, Mg, ST, EG-a)

250-G. **Ceramics—Tools of Tomorrow?** Ralph S. Towne. *Screw Machine Engineering,* v. 16, Aug. 1955, p. 35-38.

Cutting speeds nine times faster than toolsteels and three times faster than carbides have been used successfully in experimental turning of steel with ceramic tooling. Diagrams, table, photograph. (G17, ST)

251-G. **Cutting Applications. Steel Mill Finds Many Uses for Oxygen, Acetylene.** Raymond Kopecky. *Welding Engineer,* v. 40, Aug. 1955, p. 34-36.

Illustrates production applications either as an emergency measure or as permanent modifications, usually oxy-acetylene cutting. Photographs. (G22, ST)

252-G. (German.) **Prevention of the Formation of Martensite on Torch Cuts.** Fritz Dechner and Hermann Speich. *Stahl und Eisen,* v. 75, no. 14, July 14, 1955, p. 912-913.

Flame cutting tests on 6 to 30-mm. thick plates of steels St 37, St 50, St 52, and St 70; effects of the plate thickness, feed rate and the steel type on the prevention of hardening phenomena; arrangement of the annealing torch. Table, graphs. 2 ref. (G22, N8, ST)

253-G. **Choosing Machine Tools for Medium-Run Production.** W. W. Gilbert. *Iron Age,* v. 176, Aug. 25, 1955, p. 211-214.

Criteria should be fastest possible cutting job with minimum vibration, time-saving potential for tooling setups and changes, work handling and maintenance efficiencies. Diagram, photograph. (G17)

254-G. **The Manufacture and Tolerancing of Screw Threads on Optical Components, With Special Reference to the R.M.S. Microscope Objective and Nosepiece Threads.** L. W. Nickols. *Royal Microscopical Society, Journal,* v. 75, ser. 3, pt. 1, 1955, p. 58-62.

Methods of cutting and inspection of objective and nosepiece threads for R.M.S. microscope. Proposed U. S. standard and recommendations for revision of R.M.S. standard. Tables. (G17, S14, S22)

255-G. **Deep Drawing of Nimonic 75 and Stainless Steel.** *Sheet Metal Industries,* v. 32, no. 340, Aug. 1955, p. 572-575, 580.

Design and operation of the "Lancastrian" press for making gas turbine units. Photographs, diagrams, table. (G4, Ni, SS)

256-G. **Tolerances in Metal Stampings.** Federico Strasser. *Steel Processing,* v. 41, Aug. 1955, p. 505-508.

Discussion of ample tolerances, proposed standards, blank increase by tool wear, selection of tool type, forming dies and corrective operations. Diagrams, table. (G3, S22)

257-G. **Cold Heading Lubricants.** E. Jefferson Crum. *Wire and Wire Products,* v. 30, Aug. 1955, p. 899.

Cold extrusion lubricants and their use on cold heading wire. (G10, G21)

258-G. (German.) **Use of the AGA Joint Planer in the Maintenance of Railroad Tracks.** K. Bombera and V. Trunschitz. *Schweisstechnik,* v. 9, no. 6, June 1955, p. 61-64.

Use of oxy-acetylene flame-planing device in maintenance of railroad crossings. Diagrams, photographs. (G22)

259-G. (German.) **The Deep-Drawing Steels.** Hubert Hoff. *Stahl und Eisen,* v. 75, no. 15, July 28, 1955, p. 949-956; disc., p. 956-958.

Development in the production of thin sheets and strips, inherent characteristics of effervescent, semi-killed and killed steels, requirements of the chemical composition, structure and surface finish, measures to be taken to yield an appropriate structure and sound surface free of defects. Graphs, diagrams, photograph, micrographs, table. 37 ref. (G4, ST)

260-G. **Steel Rule Technique Cuts Costs of Metal-Blanking Dies.** Henry Lefer. *Aviation Week,* v. 63, Sept. 12, 1955, p. 44-48, 51.

Technique uses plywood-supported high-carbon steel rules in conjunction with a steel male die in place of conventional steel plate dies. Photographs. (G2, Al, Cu, ST, Ti)

261-G. **Auto-Machining.** P. Sorin. *Microtecnic (English Ed.),* v. 9, no. 3, 1955, p. 125-134.

Results of experimental observations on the importance of physical factors during the process of automatic machining. Diagrams, photographs, graphs, tables. (G17, Al, Cu, ST)

262-G. **Advances in Drilling Techniques Arising From Recent Research.** D. F. Galloway. *Microtecnic (English Ed.),* v. 9, no. 3, 1955, p. 135-141.

Results of extensive researches carried out on different aspects of the performance of drills between 0.0135 in. and 2½ in. in diameter. Flow chart, diagram, graphs, photographs, tables. (G17)

263-G. **Spark-Gap Tracer Control.** *Product Engineering,* v. 26, 1955, p. 148-153.

Method of duplicating small parts of complex form and shape by use of tracer controls. Photographs, diagrams, graph. (G17)

264-G. (French.) **Industrial Applications of the Diamond.** F. Fromholt. *Métallurgie et la construction mécanique,* v. 87, no. 7, July 1955, p. 591 + 5 pages.

Properties of natural and artificial diamonds, and their uses in tools and grinding wheels. Micrographs, diagrams. (G18)

H

Powder Metallurgy

158-H. (French.) **Modern Methods for Hard Alloys Production.** R. Ber-

nard. *Metallurgia italiana,* v. 47, no. no. 6, June 1955, p. 245-250.
Manufacture of 94% tungsten carbide, 6% cobalt alloy and development of modern alloys with abrasion, cratering, and shock-resistant properties. Tables, graphs, micrographs. (H10, H11, SG-j, m)

159-H. Precision Parts Sintered in Gas Fired Furnace. Robert O. Borden. *Industrial Heating,* v. 22, Aug. 1955, p. 1576 + 5 pages.
Equipment and procedures for sintering bronze bushings. Diagrams, photographs. (H15, Cu)

160-H. Powder Metallurgy—Its Role in the Design of Nuclear-Power Reactors. H. H. Hausner and M. C. Kells. *Mechanical Engineering,* v. 77, Aug. 1955, p. 665-669.
Material problems, applications of metal-powder components. Diagram, graphs, photograph. 10 ref. (H general, T25)

161-H. Europe Goes Ahead in Iron-Powder Metallurgy. Sven I. Hulthén. *Metalworking Production,* v. 99, Aug. 19, 1955, p. 1449-1454.
Postwar progress; different powders compared. Tables, graphs, photograph. 6 ref. (To be continued.) (H general, Fe)

162-H. Caster Wheels—Cast Iron or Powdered Iron? Keith McElwain. *Precision Metal Molding,* v. 13, Sept. 1955, p. 63-64, 106.
Use of powder metallurgy as a method for producing concentric, self lubricating, tough, wear-resistant wheels. Photographs, tables. (H general, CI, Fe)

163-H. Investigation of the Sintering Mechanism of the System Copper-Nickel by Means of Ferro-Magnetic Suspensions. G. F. Hüttig, K. Torkar and H. H. Weitzer. *Powder Metallurgy Bulletin,* v. 7, Aug. 1955, p. 48-52.
Studies of sintered bundles of fine wires. Micrographs. 7 ref. (H15, Cu, Ni)

164-H. The Rolling of Strip From Metal Powders. P. E. Evans and G. C. Smith. *Sheet Metal Industries,* v. 32, no. 340, Aug. 1955, p. 589-592.
Development of the rolling of powders, size limit of strip, sintering, mechanical and heat treatment, directional properties and potentialities of the method. Diagram. 23 ref. (H14)

165-H. Fabrication of Air-Cooled Turbine Blades by Powder Metallurgy. R. W. A. Buswell. *Metal Treatment and Drop Forging,* v. 22, Aug. 1955, p. 325-328.
Method for making gas-turbine rotor blades and nozzle vanes with a multiplicity of small diameter air-cooling holes extending through their entire length. Photographs, diagrams, tables. (H general, T25)

166-H. (Russian.) **The Use of Tagged Atoms in the Investigation of the Mixing of Metallic Powders.** V. P. Eliutin and A. K. Natanson. *Zavodskaia Laboratoriia,* v. 21, no. 7, July 1955, p. 820-824.
Effects of various mixing treatments on the homogeneity of iron or other powder mixtures. Graphs, tables. (H12, S19, Fe)

J
Heat Treatment

179-J. Modern Furnaces Can Pay Their Way. A. H. Koch. *American Machinist,* v. 99, Aug. 15, 1955, p. 112-115.
Recent developments in construction materials, design and mechanized equipment. Photographs, diagrams. (J general)

180-J. Town Gas for the Heat Treatment of Metals. G. A. Peterson. *Australasian Engineer,* 1955, June, p. 56-61.
Advantages of gas heating, use of special atmospheres prepared from town gas, manual and automatic control of gas equipment, design of gas fired furnaces. Diagram, photographs. 8 ref. (J2)

181-J. Low-Frequency Induction Melting and Heating. R. K. Treloar. *Australasian Engineer,* 1955, June, p. 62-69.
Principles; history and development of induction furnaces; present applications. Diagrams, photographs. (J2, C21, D6)

182-J. Special Setup for Heat Treating Greatly Reduces Fire Hazard. Joseph Geschelin. *Automotive Industries,* v. 113, Aug. 1, 1955, p. 70-72, 113.
Ford Livonia plant is designed with the heat treating plant isolated in a corner of the area and capable of being sealed off, if necessary. Photographs. (J26, A7, CN)

183-J. A Review of Some Factors Influencing Nitriding Practice. G. J. Cox. *Birmingham Metallurgical Society, Journal,* v. 35, June 1955, p. 213-230.
Effects of temperature, time, surface condition, pressure and other variables on properties of nitrided steels. Graphs, tables. 49 ref. (J28, ST)

184-J. Isothermal Hardening of Alloy Tool Steels. Iu. A. Geller. *Engineers' Digest,* v. 16, July 1955, p. 323-325. (Translated from *Stanki i Instrument,* 1954, no. 10, Oct., p. 16-20.)
Previously abstracted from original. See item 33-J, 1955. (J26, N8, TS)

185-J. How Bendix Aviation Heat Treats Magnesium. Al Ludwig. *Industrial Gas,* v. 34, Aug. 1955, p. 3-5, 24.
Utilization of CO_2 furnace atmosphere results in higher and more consistent physical properties than were obtained from former installations with SO_2 atmospheres. Photographs, graph. (J2, Mg)

186-J. Which Method for High Speed Surface Hardening? W. S. Hyler and H. J. Grover. *Materials & Methods,* v. 42, Aug. 1955, p. 103-105.
Advantages and limitations of induction and direct gas heating compared; production costs evaluated. Photographs, table. 6 ref. (J28)

187-J. Modern U.S. Gas Carburising and Carbonitriding Practice. Norbert K. Koebel. *Metallurgia,* v. 52, no. 309, July 1955, p. 3-10.
Early gas carburizing practice, modern practice, principle of the endothermic generator for producing the carrier gas, modern gas carbo-nitriding process, design of modern carburizing and carbo-nitriding furnaces. Photographs, diagrams, graphs. (J28)

188-J. A Review of Salt Bath Carburizing. II. E. N. Case. *Metal Treating,* v. 6, July-Aug. 1955, p. 8-9, 33.
Catalysts, advantages and applications of cyanide baths. Photographs, graphs. (J28, J2)

189-J. An Unusual Commercial Heat Treating Plant. *Metal Treating,* v. 6, July-Aug. 1955, p. 12-13, 26.
Description and operation of plant which provides effective control of heating, cooling and atmosphere. Photographs. (J general, A5)

190-J. Commercial Bright Hardening of Stainless Steels. Fred Hunter. *Metal Treating,* v. 6, July-Aug. 1955, p. 20-22.
Equipment and operation of a controlled atmosphere heat treatment furnace. Diagram, photographs, table. (J2, SS)

191-J. A New Technique for the Surface Hardening of Crankshafts. Tom Bishop. *Metal Treatment and Drop Forging,* v. 22, July 1955, p. 295-298.
Patented German induction heating units and process. Photographs. (J2, CI)

192-J. Titanium Alloys Are Heat Treatable. C. R. Cook. *Metal Treating,* v. 6, July-Aug. 1955, p. 2-4, 6, 33.
Heat treatment, structure and properties of various types of alloys. Tables, micrographs. (V, J general, Ti)

193-J. Flame-Hardening by Oxy-Town Gas. *Metalworking Production,* v. 99, July 22, 1955, p. 1291-1292.
Some typical examples, including description of machines installed for hardening diesel crankshaft pins and journals. Photograph. (J2, CN)

194-J. Is Oil Quenching Best for Pearlitic? John E. Kruse. *Modern Castings and American Foundryman,* v. 28, July 1955, p. 85-90.
Effects of variations in heat treatment on strength and structure of malleable iron. Micrographs, graphs, tables. 6 ref. (J26, Q23, M27, CI)

195-J. Annealing of Point Defects in Metals and Alloys. W. M. Lomer and A. H. Cottrell. *Philosophical Magazine,* v. 46, 7th ser., no. 378, July 1955, p. 711-719.
Analysis of published data on the recovery of resistivity during annealing of metals at low temperatures, after damage by irradiation, quenching or cold work. Table. 12 ref. (J23)

196-J. Quench Hardening in Aluminium Single Crystals. R. Maddin and A. H. Cottrell. *Philosophical Magazine,* v. 46, 7th ser., no. 378, July 1955, p. 735-743 + 1 plate.
Results of experiments to alter state of imperfection in single crystals of aluminum by means of heat treatment, and to examine this effect on the plastic properties of the crystals. Diagram, graph, tables, micrographs. 7 ref. (J26, Al)

197-J. Mercury Arc Rectifiers for Frequency Changing on Induction Heating Equipment. *Wild-Barfield Heat-Treatment Journal,* v. 5, June 1955, p. 2-6.
Operating cycle and advantages over oil or gas-fired furnaces. Graphs, diagram, photograph. (J2)

198-J. Gas Carburizing Atmospheres. L. G. W. Palethorpe. *Wild-Barfield Heat-Treatment Journal,* v. 5, June 1955, p. 10-15.
Separately generated atmospheres, furnace generated (drip feed) atmospheres, proprietary Carbodrip atmosphere. Tables, diagrams, photographs. (To be continued.) (J28, J2, ST)

199-J. (Dutch.) **Heat Treatment of Aluminum-Magnesium Alloys With 9% and Higher Magnesium Content.** L. J. G. van Ewijk. *Metalen,* v. 10, no. 13, July 15, 1955, p. 269-273.
Basic composition of alloys (A 9, A 10.5, A 12, B 9, B 10.5, B 12). Influence of heat treatment conditions on the strength properties of alloys. Photographs, tables, diagrams. (To be continued.) (J general, Q23, Al)

200-J. (Dutch.) **Heat Treatment of Aluminum-Magnesium Alloy With 9%**

Magnesium or More. L. J. G. van Ewijk. *Metalen,* v. 10, no. 14, July 30, 1955, p. 291-297.
Structure analysis, strength properties. Graphs, diagram, photographs, micrographs. 1 ref.
(J general, M general, Q23, Al, Mg)

201-J. (French.) **The Superficial Hardening of Steel Pieces and Progress Obtained With Controlled Nitriding.** R. Lambert. *Revue de métallurgie,* v. 52, no. 7, July 1955, p. 553-558; disc., p. 558.
Considers constant temperature nitriding. Controlled process gives a more malleable surface. Graphs, photographs. (J28, ST)

202-J. (French.) **Flame Hardening of Cast Iron and Its Practical Application.** H. W. Gronegress. *Revue de métallurgie,* v. 52, no. 7, July 1955, p. 559-568.
Critical factors for gaging flame hardenability are the carbon content and graphite distribution, the propensity to crack formation decreases in proportion to the fineness of graphite distribution, utilization of hardened cast iron, necessary equipment. Tables, graphs, photographs, micrographs. 14 ref.
(J2, CI)

203-J. (German.) **Fundamentals and Requirements for the Accomplishment of the Oxy-acetylene Stress Relieving.** H. G. Kunz. *Schweissen und Schneiden,* v. 7, no. 7, July 1955, p. 291-297.
Fundamentals, equipment and materials for stress-relief, applications. Table, graphs, diagrams, photographs. (J1, ST)

204-J. (German.) **Is Low Temperature Annealing Necessary?** W. Soete. *Schweissen und Schneiden,* v. 7, no. 7, July 1955, p. 300-305.
Influence of initial stresses on deformations, brittle fracture of steel, fatigue of materials, stability of construction, and on corrosion. Graphs, diagrams, photographs. 12 ref. (J23, Q23, Q7, R general, ST)

205-J. (Russian.) **Heat Treatment of Welded Cutting Tool.** E. I. Malinkina. *Stanki i Instrument,* v. 26, no. 7, July 1955, p. 28-29.
Cause and prevention of cracks after heat treatment. Graphs, diagram, photograph. 4 ref.
(J general, TS)

206-J. **The Effect of Tempering Treatment on the Corrosion Resistance of Hardened 13% Chromium Steels.** J. E. Truman. *Corrosion Technology,* v. 2, Aug. 1955, p. 243-246.
Study of steels of three different carbon levels (0.06, 0.23, and 0.29%) shows that tempering heats of from 450 to 650° C. severely reduce corrosion resistance to 3% salt water. Graphs, micrographs. 2 ref.
(J29, R4, SS)

207-J. **Proper Stock Removal in Finishing Case Hardened Parts.** D. F. Hammer. *Steel Processing,* v. 41, Aug. 1955, p. 489-494.
Processes employed for producing hard surfaces on steel and allowances made for stock removal when finishing parts. Micrographs, photograph, graphs, table.
(J28, G17, ST)

208-J. **The Metallographic View. XIII. Hardenability—The Jominy Test.** H. E. Boyer. *Steel Processing,* v. 41, Aug. 1955, p. 501-502.
Use of Jominy test for evaluation of hardenability. Method of preparing specimens for test. Diagrams, graph. (J26, ST)

209-J. **Continuous Heat Treating for Automatic Production.** W. J. Behrens. *Steel Processing,* v. 41, Aug. 1955, p. 525-529.
Incorporation of heat treating furnaces in the production line to function as a machine tool. Diagrams, photographs. (J general)

210-J. (French.) **Analysis of Pusher-Type Furnaces.** M. Szczeniowski. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 8, 1955, p. 1571-1591.
Factors influencing thermal efficiency, analysis of individual factors, selection of the most suitable furnace type for prevailing conditions. Tables, graphs. 7 ref.
(J general)

211-J. (Japanese.) **A New Quenching Oil for Spring Steel.** Shigeo Owaku. *Journal of Railway Engineering Research (Japan),* v. 12, no. 9, May 10, 1955, p. 216-221.
Development of a quenching oil with a cooling velocity second only to water and having a long service life. Graphs, tables. (J2, ST, SG-b)

212-J. **Wire Mill Cuts Decarb With Infrared Analyzer.** L. D. Culp. *Automation,* v. 2, Sept. 1955, p. 54-56.
Infra-red analyzer provides continuous record of carbon dioxide content in furnace atmosphere. Photographs, graph, diagram. (J2)

213-J. **Heat Treating: Rx for Better Machinability.** F. J. Robbins and J. J. Lawless. *Iron Age,* v. 176, Sept. 1, 1955, p. 94-97.
Advantages of matching heat treatment with the machining operation. Tables, graph, micrographs.
(J general, G17, CN, AY)

214-J. **Ready: Heat Treatable Titanium.** R. G. Sherman and H. D. Kessler. *Steel,* v. 137, Sept. 12, 1955, p. 98-100.
The alloy has high strength, good ductility and excellent elevated temperature strength and stability under stress up to 1000° F. Micrographs, graphs.
(J general, Q general, Ti)

215-J. (German.) **Exchange of Experience on Flame Hardening During 1955.** *Metalloberfläche,* Ausgabe B, v. 9, no. 8, Aug. 1955, p. 118-121.
Principles of flame hardening, types of fuel-oxygen mixtures, effect of shape of steel on hardening, causes of defective hardening results, computation of costs, application to various types of repair jobs. Photographs, tables, graphs.
(J2, ST)

216-J. (Italian.) **Homogenization of Parts From Cast and Forged Steel.** A. Hencks. *Fonderia,* v. 4, no. 7, July 1955, p. 297-309.
Phenomenon of diffusion, influence of steel composition on the process of homogenization, methods and optimum conditions. Tables, graphs, micrographs. 13 ref.
(J21, N1, ST)

217-J. (Russian.) **Method of Determining the Depth of Case Hardening of Alloy Steel by Means of Isothermal Quenching.** M. M. Zamiatnin, Iu. V. El'tsin and B. I. Zviagin. *Zavodskaia Laboratoriia,* v. 21, no. 6, June 1955, p. 687-692.
Determination of carbon on boundary of case hardened layer, selection of temperature of the isothermal media. Conditions of determination (time element). Graphs, micrographs. 2 ref. (J28, J26, AY)

218-J. (Book.) **Heat Treatment of Gray Iron.** C. O. Burgess. 117 p. 1954. Gray Iron Founders' Society, 930 National City—East 6th Bldg., Cleveland 14, Ohio. $5.00.
Describes the successful application of heat treatment to gray iron and indicates how its use can be expanded to make gray iron meet the increasingly stringent demands of modern industry. (J general, CI)

K Joining

367-K. **Automatic Arc Welding of Tractor Components.** D. L. Hanson. *Automotive Industries,* v. 113, Aug. 1, 1955, p. 66-67, 126.
Automatic process is cheaper, faster and better than the manual process. Photographs. (K1, ST)

368-K. **Comparison of Welded and Riveted Ship Construction.** B. Baxter. *Engineering,* v. 180, July 22, 1955, p. 108-110.
Results of investigations to find relationship, if any, between welded ship failures and design, with particular reference to the differences in structural behavior between riveted and welded ships. Graph.
(K1, K13, K9)

369-K. **Induction Soldering.** I. D. Warburton-Brown. *Machinery Lloyd (Overseas Ed.),* v. 27, July 23, 1955, p. 37, 39, 41-42.
Some information on alloys used and theoretical principles underlying formation of joints, detailed description of the high-frequency method of soft soldering. Diagrams, graph, tables. (To be continued.)
(K7)

370-K. **Stud Welding With Welding Cartridges.** W. P. van den Blink, E. H. Ettema, and P. C. van der Willigen. *Philips Technical Review,* v. 17, Aug. 1955, p. 37-45.
Semiconducting welding cartridge on stud end serves as heater, spacer and flux for correct stud placement. Diagrams, photographs. 5 ref.
(K1, ST)

371-K. **Filler Metals for Joining.** Orville T. Barnett. *Welding Engineer,* v. 40, Aug. 1955, p. 30-32.
Describes E6010 d.c. electrode and the more versatile E6011 a.c. or d.c. electrode and their applications. Tables, diagrams, photograph. 2 ref. (K1, T5, ST)

372-K. **Copper Contacts Formed Faster.** Corwin S. Selby. *Welding Engineer,* v. 40, Aug. 1955, p. 40-41.
Formerly "hogged" from solid ships, contacts are made faster, cheaper and better by brazing and soldering. Photographs.
(K7, K8, Cu)

373-K. (French.) **Application of "Downward" Welding to the Joints of Pipelines.** L. Riviere. *Arcos,* v. 32, no. 132, 1955, p. 3420-3426.
Conditions and electrodes used in and advantages of a new French method. Diagrams, photographs.
(K1, ST)

374-K. (German.) **Soft Solders for Special Purposes.** A. Keil. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 689-692.
Properties, uses and applications of binary and ternary alloys of cadmium, zinc, lead and tin as solders; influence of copper and silver additions. Diagrams, graphs, tables, micrograph. 9 ref.
(K7, Cd, Zn, Pb, Sn, Cu, Ag)

375-K. (German.) **Progress in the Field of Welding and Cutting.** K. L. Zeyen. *Schweissen und Schneiden,* v. 7, no. 7, July 1955, p. 305-313.
Hydrogen in austenitic weld seams, and its influence in non-welded steel; hydrogen content in welded seams and its determination. Tables. 42 ref. (K2, ST)

376-K. (Russian.) **Soldering With Heat Resistant Solders.** V. A. Gorokhov and M. I. Skripov. *Vestnik*

Mashinostroeniia, v. 35, no. 7, July 1955, p. 47-51.
Composition of the solder, method of operation, strength properties of soldered joints. Graphs, diagrams, micrographs. (K7, Q23)

377-K. Arc-Welding Costs: Proposals for Proving New Methods of Measurement. A. G. Thompson. *British Welding Journal,* v. 2, Aug. 1955, p. 350-357.
Design of tests and procedures to investigate proposed methods of measuring cost-output relationships for arc welding. Tables, graphs, diagrams. 3 ref. (K1)

378-K. Some Interesting Welding Investigations. II. W. P. Campbell and M. J. Nolan. *Canadian Metals,* v. 18, Aug. 1955, p. 47-48, 50.
Effects of errors in technique on performance of welds in steam piping. Photographs, micrographs. (K general)

379-K. New Control System Cuts Scrap Loss on Tube Welding Line. D. C. Fisher. *Iron Age,* v. 176, Aug. 4, 1955, p. 84-86.
New automatic control system for induction welding electrical conduit line measures strip thickness, stores information while tubing is being formed, then sets welding current accordingly. Diagrams, photographs. (K6, S14, ST)

380-K. Design of Joints for Induction Soldering. D. Warburton-Brown. *Machinery Lloyd (Overseas Ed.),* v. 27, July 30, 1955, p. 69-78.
Practical joint and workcoil designs for several products. Graph, diagrams, photograph. (K7)

381-K. Bonding Aluminium-Tin Alloys to Steel. *Tin and Its Uses,* 1955, no. 32, July, p. 8-9, iii of cover.
Bond is accomplished by intermediate iron-aluminum alloy layer. Photograph, micrograph. (K5, Al, Fe, Sn)

382-K. Radiographic Standards for Quality Control of Aluminium Alloy Butt Welds by the Self-Adjusting Arc Process. J. G. Young. *Welding and Metal Fabrication,* v. 23, Aug. 1955, p. 278-285.
Techniques used in preparation of samples and description of radiographic technique and method of interpretation of radiographs. Mechanical test techniques and results discussed and compared with defects apparent from radiographs. Tables, graph, radiographs, micrographs. (K9, K1, S13, Al)

383-K. Resistance Welding of Stabilized Stainless Steel Strip. E. J. Keefe and D. R. Nash. *Welding and Metal Fabrication,* v. 23, Aug. 1955, p. 289-294.
Results of tests indicating that the addition of stabilizing elements produces differences in both the weld strength and in the optimum welding conditions. Tables, graphs, micrographs, macrographs, diagrams. 6 ref. (K3, SS)

384-K. Electrolytic Welding and Brazing. P. Zuffa. *Welding Journal,* v. 34, Aug. 1955, p. 378S.
Physical principles of electrolytic heating and applications. Circuit diagrams. (K1, K8)

385-K. Effects of Interstitial Elements on Weldability of Titanium Alloy Sheet. I. H. M. Meyer. *Welding Journal,* v. 34, Aug. 1955, p. 379S-393S.
Impairment of the weldability of titanium alloy sheet, under some conditions, by three interstitial elements, carbon, nitrogen and oxygen. Tables, graphs, photograph, micrographs. 8 ref. (K9, Ti)

386-K. Maintenance Welding and Cutting Operations on Radioactive Process Equipment. E. B. Lavelle and J. M. Fox, Jr. *Welding Journal,* v. 34, Aug. 1955, p. 731-740.
Account of detailed preparations using protective clothing and devices, timed movements and rehearsed steps to protect personnel and assure satisfactory maintenance welding operations. Photographs. (K1, G22, A7)

387-K. Fabrication of Bridge Plate Girders by Submerged Arc Welding. Joseph H. Hoffman. *Welding Journal,* v. 34, Aug. 1955, p. 741-746.
Method of fabricating a welded plate girder bridge span starting with the cutting to size of the plates, jigs used for fitting and welding, welding procedure using the tandem submerged-arc-welding process, shop changes in welding machine carriage to suit welding conditions, and loading for shipment. Photographs, diagrams. 3 ref. (K1, ST)

388-K. Joint Detail for Inert Arc Welding of Pressure Piping. R. T. Pursell. *Welding Journal,* v. 34, Aug. 1955, p. 747-751.
Technique wherein proper preparation of root edges of joint produces satisfactory uniform inside bead conditions in all positions. Photographs, table, diagrams. (K1, ST)

389-K. Evaluating the Iron-Powder Coated Electrodes for Production Use. Donald B. Howard. *Welding Journal,* v. 34, Aug. 1955, p. 752-758.
Preliminary tests performed on 23 different brands; evaluation in accordance with requirements of ASTM specifications. Photographs, tables, diagram. (K1, S22)

390-K. Some New Concepts on Welding Qualification Requirements. S. A. Greenberg. *Welding Journal,* v. 34, Aug. 1955, p. 759-760.
Requirements for the degree of qualification for a joint welding procedure based on the severity of service conditions for which a product or structure is designed. (K general, S22)

391-K. Structural Steel Welding. A. L. Fenlason. *Welding Journal,* v. 34, Aug. 1955, p. 768-769.
Joint design, welding procedure, operation qualifications and visual inspection of welds. Photographs. (K1, ST)

392-K. Nickel Chrome Brazing of Stainless. R. A. Gustafson. *Western Metals,* v. 13, Aug. 1955, p. 54-56.
Advantages of nickel-chromium brazing alloys, characteristics of joints, brazing furnaces. Micrograph, photographs. (K8, SS)

393-K. The Metallurgical Principles of the Joining of Metals. Hugh O'Neill. Paper from "The Joining of Metals". Institution of Metallurgists, p. 5-25.
History, contaminants, joints with nonmetals, solid phase welding and other aspects. Tables, graphs, diagram, photographs, micrograph. 36 ref. (K general)

394-K. Metallurgy of the Welding of Non-Ferrous Metals. W. K. B. Marshall. Paper from "The Joining of Metals". Institution of Metallurgists, p. 26-59.
Problems of oxide inclusions, effects of gases, termal effects and corrosion to this heterogeneous group considered. Table, graphs, photographs, micrographs. 23 ref. (K general, EG-a)

395-K. Metallurgy of Welding of Carbon and Low Alloy Steels. L. Reeve. Paper from "The Joining of Metals". Institution of Metallurgists, p. 60-94.
Considers the deposited weld metal, the arc welding electrodes and base material, especially in the weld boundary and the heat effected zone. Tables, graphs, diagrams, photographs, micrographs. 21 ref. (K1, ST)

396-K. The Metallurgy of Welding of the Cr-Ni Austenitic Steels. F. H. Keating. Paper from "The Joining of Metals". Institution of Metallurgists, p. 95-126.
Effects of heating during oxyacetylene welding of these alloys and measures required to maintain metal quality. Tables, graphs, photographs, micrographs. (K2, N8, AY)

397-K. The Metallurgy of Soldering and Brazing. J. C. Chaston. Paper from "The Joining of Metals". Institution of Metallurgists, p. 127-145.
Five critical properties for successful solder or braze. Graphs, diagrams, photograph, phase diagrams. 8 ref. (K7, K8)

398-K. The Determination of Weldability. J. G. Ball. Paper from "The Joining of Metals". Institution of Metallurgists, p. 146-174.
Review limited to determining suitability of materials for joining rather than performance in service. Numerous British, American and German tests illustrated. Graphs, diagrams, photographs, micrographs. 20 ref. (K9)

399-K. Epoxy-Resin Base Adhesives. D. W. Elam. Paper from "Symposium on Adhesives and Sealants in Aircraft Applications". Society of Automotive Engineers, 11 p. + 7 plates.
Chemistry of epoxy resins, theory of cure with various curing agents, requirements during processing, physical properties of adhesive bonds over a range of temperature. Examples of aircraft sub-assemblies which were bonded with epoxy-base adhesives. Tables, photographs, diagrams, graphs. 3 ref. (K12)

400-K. Phenolic Based Adhesives. E. P. Carmichael and W. F. Gross. Paper from "Symposium on Adhesives and Sealants in Aircraft Applications". Society of Automotive Engineers, 8 p. + 6 plates.
Types, processing characteristics, properties of joints. Tables, graphs, photographs. (K12)

401-K. Rubber-Like Adhesives and Sealants. W. J. Clayton and R. K. Humke. Paper from "Symposium on Adhesives and Sealants in Aircraft Applications". Society of Automotive Engineers, 15 p. + 1 plate.
Uses in various industries, advantages over other fasteners, special applications, vehicles and solvents, future possibilities. Graphs, diagrams. (K12)

402-K. The Theory and Fundamentals of Adhesion. N. A. de Bruyne. Paper from "Symposium on Adhesives and Sealants in Aircraft Applications". Society of Automotive Engineers, 11 p. + 6 plates.
Wetting of adherend by adhesive, capillary forces between flat plates, effect of contact angle on stress concentration, stress distribution in lap and butt joints, intermolecular forces. Photographs, graphs, diagrams. 23 ref. (K12)

403-K. (French.) **Some Applications of Welding to the Construction and Maintenance of Modern Equipment of Power Plants.** A. Lüthy. *Zeitschrift für Schweisstechnik,* v. 45, no. 8, Aug. 1955, p. 145-156, 161-163.
Welding of live-steam pipes, cast iron turbine frames, turbine shafts, generators, transformers, turbine wheels. Photographs, diagrams. (K1, CI, ST)

404-K. Chromium Carbide Requires Special Flux for Silver Brazing. C. R. Benson and E. S. Chamer. *American Machinist,* v. 99, Sept. 12, 1955, p. 126-127.
Use of a boron-containing flux gives stronger joints, resistant to higher temperatures. Photographs, table. (K8, Cr, C-n)

405-K. Aluminum Pipe Field Welding Speeded by Inert Gas Shielded Metal Arc Process. R. A. Stone and W. H. Wooding. *Heating, Piping & Air Conditioning,* v. 27, Sept. 1955, p. 113-117.
Advantages include fast welding speeds, good heat concentration, removal of surface oxide and prevention of reoxidation and absorption of gas by the weld metal. Photographs, tables. (K1, Al)

406-K. Ceramic Back-Up Rings for Pipe Welding. Lew Gilbert. *Industry & Welding,* v. 28, Sept. 1955, p. 40-42, 44.
Pipe is welded with a very slight land and no root gap. Back-up ring is removed. Diagram, photographs. (K1, SS)

407-K. How to Braze Fittings to Steel and Copper Tubing. Charles Berka. *Industry & Welding,* v. 28, Sept. 1955, p. 46-48, 96-97.
Jigs, brazing alloys and techniques illustrated. Braze metal clearances are maintained. Photographs. (K8, Cu, CI, ST)

408-K. Your Stainless Welds—Are They Corrosion-Resistant? Leak-Tight? A. Grodner. *Industry & Welding,* v. 28, Sept. 1955, p. 52-54, 98-99.
Fabrication and test details for a 30,750-gal. stainless steel (Type 316 ELC) atomic waste storage tank. Photograph, diagram. (K1, SS)

409-K. Do's and Don'ts for Welding Structural Steel. Charles I. Orr. *Industry & Welding,* v. 28, Sept. 1955, p. 58 + 5 pages.
Seven design points stressed. Usual sins are using rivet designs and overwelding. Photographs. (K1, ST)

410-K. How and Where to Use Seam Welding. *Industry & Welding,* v. 28, Sept. 1955, p. 71-74.
Step-by-step details for welding steel and other metals; gas-tight welds. Tables. (K3, ST, Al)

411-K. Multiple Spot Welding by the "Press Welding" Technique. *Machinery (London),* v. 87, Aug. 5, 1955, p. 284-293.
Application of a high-speed process to auto body fabrication. Diagrams, photographs. (K3, ST)

412-K. Spot Welding of Structural Aluminum. William R. Gain. *Product Engineering,* v. 26, Sept. 1955, p. 193-198.
Use of spot welding on aircraft gives sound joints when weld current, weld and forging pressures and metal cleaning are accurately controlled. Advantages over other joining methods include high production rate, no added weight, relatively smooth flush surface and no holes in sheet to be sealed. Photographs, diagrams, table, graphs. (K3, Al)

413-K. Braze-Welding Rods Are All-Purpose Tools. Joseph Imperati. *Welding Engineer,* v. 40, Sept. 1955, p. 26-28.
Use in a wide variety of fabrication and maintenance purposes. Photographs. (K2, TS, Cu)

414-K. (German.) **Prestressed Bolts in Steel Construction.** O. Steinhardt. *VDI Zeitschrift,* v. 97, no. 21, July 21, 1955, p. 701-708.
Experiments indicate that replacement of riveted or welded joints by joints formed with prestressed bolts improves the fatigue-stress resistance of large steel structures. Tables, diagrams, chart, photograph. 1 ref. (K13, Q7, ST)

415-K. (Spanish.) **Basic Electrodes.** José Callejo. *Ciencia y técnica de la Soldadura,* v. 5, no. 24, May-June 1955, 18 p.
Study of a new type of electrode with low hydrogen content, applications and methods of use on high carbon steels, welding of soft-steel constructions and iron castings. Tables, graphs, photographs, diagrams. (K1, CN, SS, Fe)

416-K. (Spanish.) **Regulating the Voltage and Improving the Power Factor in Resistance-Welding Machines.** R. de Heredia Scasso. *Ciencia y técnica de la Soldadura,* v. 5, no. 24, May-June 1955, 8 p.
Calculation and mounting of series capacitors in above machines. Graphs, diagrams. 3 ref. (K3)

417-K. (Spanish.) **The Use of Different Fluxes in the Welding of Copper.** R. Mearin. *Ciencia y técnica de la Soldadura,* v. 5, no. 24, May-June 1955, 4 p.
Five different fluxes studied to determine most desirable for obtaining a welded joint with the least quantity of oxygen along the seam. Micrographs. (K1, Cu)

418-K. (Spanish.) **What Is Welding?** A. Vollmaier. *Ciencia y técnica de la Soldadura,* v. 5, no. 24, May-June 1955, 12 p.
Various fields of application of electric arc welding. Graphs, diagrams, photographs. (K1)

419-K. (Pamphlet.) **Welding and Brazing. A Bibliography of Unclassified Report Literature.** Gifford A. Young, compiler. TID-3059. 46 p. 1955. U. S. Government Printing Office, Superintendent of Documents, Washington 25, D. C. $0.30.
Annotated list of 226 reports as of Oct. 1, 1954 with data on welding and brazing of ten metals of A.E.C. interest. (K general)

420-K. (Book.) **Brazing Manual.** 193 p. 1955. Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. $4.75.
A complete handbook limited to industrial applications involving brazing metal-to-metal assemblies. The material is devoted to principles, equipment, and procedures involved in all eight brazing processes, to precleaning, surface preparation, post braze cleaning and inspection, and to techniques of brazing various metals. (K8)

421-K. (Book.) **Symposium on Adhesives and Sealants in Aircraft Applications.** Papers individually paged. Society of Automotive Engineers, 29 West 39th St., New York 18, N. Y.
Four papers from a symposium on theories and fundamentals of various adhesives and sealants used in the aircraft industry. Papers are individually abstracted. (K12)

L
Cleaning, Coating and Finishing

574-L. Distribution of Crystals in Titania Enamels Fired Directly on Steel. E. D. Lynch and A. L. Friedberg. *American Ceramic Society, Journal,* v. 38, Aug. 1955, p. 257-263.
Technique for studying relation of the crystalline nature of the enamel to the bond developed on fired enamel specimens. Tables, graphs, micrographs, photographs. 11 ref. (L27, ST)

575-L. Protective Linings for Corrosive Materials. J. Melbourn. *Canadian Chemical Processing,* v. 39, July 1955, p. 34, 36.
Properties of various chemical-resistant coatings for steel containers. Photographs. (L26, ST)

576-L. Hot Dip Aluminium Coating for Cast Iron. Shigetomo Ueda. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 38-41.
Application methods, coating properties. Diagram, tables, graphs, micrograph. 2 ref. (L16, Al, CI)

577-L. The Ternstedt-Spray Process. Howard E. Smith. *General Motors Engineering Journal,* v. 2, July-Aug. 1955, p. 23-25.
Fundamentals, uses and advantages of an electrostatic painting process for applying decorative and protective coatings. Diagram, photographs. (L26)

578-L. Electrochemical Principles of Metallic Coatings. III. Corrosion at Pores and Discontinuity in Metallic Coatings. L. L. Shreir. *Industrial Finishing (London),* v. 8, July 1955, p. 389-392, 394, 400.
Factors controlling corrosion at a pore in a coating; anodic and cathodic coatings; porosity tests. Micrographs, diagrams. 31 ref. (L general, R1, R11)

579-L. Prevention of Paint Failures. III. Faults Due to Flow, Tumbling, Roller, Silk Screen Application, etc. *Industrial Finishing (London),* v. 8, July 1955, p. 396-398, 400.
Disadvantages of the application methods, means by which troubles in their use may be averted. Photographs. (L26)

580-L. Zinc Coatings on Steel. R. W. Bailey. *Industrial Finishing (London),* v. 8, July 1955, p. 401 + 6 pages.
History and characteristics of varying types of zinc coatings, details of exposure test work on them. Micrographs, graphs, photographs, tables, diagrams. 8 ref. (L16, Zn)

581-L. How Zinc Coatings Slow Atmospheric Corrosion. O. B. Ellis. *Iron Age,* v. 176, Aug. 18, 1955, p. 79-81.
Long-term exposures of specimens reveal their behavior under different atmospheric conditions. Graphs, micrograph. (L16, R3, Zn, Fe)

582-L. New Instrument Controls Rinse Tank Flow Automatically. J. B. Mohler. *Iron Age,* v. 176, Aug. 18, 1955, p. 82-83.
Device controls flow according to total conductivity of the rinse. Diagram, photograph. (L17, S19)

583-L. Great Flexibility—a Feature of New Automatic Plater. Nathaniel Hall. *Metal Finishing,* v. 53, Aug. 1955, p. 45-48.
Description and operation of an automatic nickel and chromium plater for mass production. Photographs. (L17, Cr, Ni)

584-L. Electrodeposition of Nickel From Fluoborate Solutions. C. B. F. Young and William Strobach. *Metal Finishing,* v. 53, Aug. 1955, p. 53-58.
Equipment, baths, additives. Graphs, photograph. (To be continued.) (L17, Ni)

585-L. Electroless Nickel Deposition. Fred Pearlstein. *Metal Finishing,* v. 53, Aug. 1955, p. 59-61.
Efforts to produce a thin film of palladium on nonconductors, render-

ing the surface active for the reduction of nickel from the electroless nickel bath. Photographs, tables. (L14, Ni, Pd)

586-L. Protection of Magnesium-Base Alloys. W. F. Higgins. *Metal Industry,* v. 87, July 29, 1955, p. 87-89, 93.

Special problems regarding painting of magnesium alloy castings and a composite scheme which embraces suitable foundation treatments with adequate painting measures. Table. (L26, Mg)

587-L. Radar Parts Precious Metal Plated for Conductivity. Burt R. Servass. *Precision Metal Molding,* v. 13, Aug. 1955, p. 52-53, 80.

Job plating of small parts with silver and palladium. Photographs. (L17, Ag, Pd)

588-L. Metallized Plastic Films. Thomas Hammer. *Product Engineering,* v. 26, Aug. 1955, p. 182-185.

Types, properties and uses for plain or laminated films, with coatings from 2½ to 16 millionths thick. Table, diagram, photograph. (L25, Al, Ag, Au)

589-L. Aldip Coating Improves Valve Durability. R. F. Thomson, D. K. Hanink, E. B. Etchells and K. B. Valentine. *SAE Journal,* v. 63, Aug. 1955, p. 54-56.

Process for improving durability of engine intake and exhaust valves by use of a dip coating. Diagram, micrographs, graphs, photograph, table. (L16, Al)

590-L. (English.) **Surface Treatment of Core Metal Used for Oxide-Coated Cathode.** Junkichi Nakai and Shogo Nakamura. *Physical Society of Japan, Journal,* v. 10, no. 7, July 1955, p. 566-570.

Experiments showing effect of contaminated surface layers on activity of drawn nickel sleeves that have suffered severe mechanical processing and heat treatment. Diagrams, graphs, tables. 1 ref. (L14, Ni)

591-L. (French.) **Study of Electrolysis in Very Concentrated Solution. Example of Electrolytic Polishing. II. Proof of Existence of an Adsorbed Ion Layer on the Electrode Surface. III. Water Content During Electrolysis in Very Concentrated Solution. IV. Electric Output. V. Practical Applications.** Philippe Brouillet. *Métaux, Corrosion-Industries,* v. 30, no. 357, May 1955, p. 192-219; no. 358, June 1955, p. 243-257.

Different types of electrode and anodic voltages in presence of perchlorate ions, phosphoric ions and fused salts; existence of an anhydrous zone around the anode and absorption of atmospheric water; yield of dissolution in relation to the Faraday law. Diagrams, tables, graphs, photographs, micrographs. 39 ref. (L13)

592-L. (French.) **Thin Coating Under Vacuum.** R. P. Henry. *Vide,* v. 10, no. 57, May-June 1955, p. 50-63.

Theoretical bases, methods, technique of coating and applications. Table, graphs, diagrams, photographs. (L25)

593-L. (German.) **Hard Anodizing.** L. Bosdorf and A. Beyer. *Aluminium,* v. 31, nos. 7-8, July-Aug. 1955, p. 321-327.

Eloxal anodizing process, by Alcoa, which permits new fields of application for aluminum. Table, graphs, diagrams, photographs, micrographs. 15 ref. (L19, Al)

594-L. (German.) **On the Cooling of Pot-Galvanized Ware.** H. Bablik, F. Götzl and E. Nell. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 643-645.

Effects of different methods and rates of cooling on the surface structure and zinc-iron boundary zone. Graphs, micrographs, diagrams, table. (L16, Zn)

595-L. (German.) **Metallic Zinc as Protection Against Corrosion.** R. Haarmann. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 646-648.

Explains hydrogen and oxygen types of corrosion and the protection of iron against corrosion by galvanizing, electrolytic zinc plating, zinc spraying, diffusion of zinc into the iron surface, application of paints or pastes with pigment of metallic zinc dust and cathodic protection with zinc. Tables. 14 ref. (L15, L16, L17, L26, R10, Zn)

596-L. (German.) **Structure and Thermal Treatment of Zinc Coatings.** W. Ktaz. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 652-655.

Effect of structure of zinc deposit on the corrosion of zinc and zinc-coated iron; structure of the heat treated and non-heat treated hot-dip zinc coatings; effect of second heat treatment; measurement of the zinc layer thickness. Tables, micrographs. 5 ref. (L16, Zn)

597-L. (German.) **Zinc Dust as a Protection Against Corrosion.** *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 673-674.

Advantages of paints composed of pulverized zinc, zinc white and solvent. 2 ref. (L26, Zn)

598-L. (German.) **Developments in the Field of Chemical Polishing of Aluminum.** R. Lattey and H. Neunzig. *Metalloberfläche,* Ausgabe A, v. 9, no. 7, July 1955, p. 97-103.

Theory of chemical polishing, "Alupol" and "Erftwerk" polishing methods, optimum conditions, advantages. Tables, graphs, micrographs. 11 ref. (L12, Al)

599-L. (German.) **The Wash-Primer for Preconditioning Metals and Universal Prime-Coating.** H. F. Sarx. *Werkstoffe und Korrosion,* v. 6, no. 7, July 1955, p. 331-334.

Composition, function and directions for use of a two-component wash primer. (L26)

600-L. (German.) **Corrosion Resistant Coatings of Thin Sheet Metal on Steel and Concrete.** P. Voigt. *Werkstoffe und Korrosion,* v. 6, no. 7, July 1955, p. 337-343.

Cladding of equipment, vats and tanks made of concrete, steel or masonry by welding on "shingles" of stainless or other high-alloy steel. Diagrams, photographs. (L22, L24, SS)

601-L. (Russian.) **Combination of Methods for Increasing Corrosion Fatigue Resistance of Steel.** A. V. Riabchenkov and V. F. Abramova. *Vestnik Mashinostroeniia,* v. 35, no. 7, July 1955, p. 54-57.

Investigation of surface hardening followed by electrolytic chromium or zinc coating, surface hardening in combination with cathodic protection. Tables, graphs, diagram, photograph. 9 ref. (L17, R10, R1, ST)

602-L. (Russian.) **Chromium Plating of Compression Piston Rings of Magnesium Cast Iron.** N. A. Solov'ev. *Vestnik Mashinostroeniia,* v. 35, no. 7, July 1955, p. 75-77.

Standard requirements for rings, composition of electrolyte, control of operation, possible defects, their prevention and correction. Diagrams, micrograph. 5 ref. (L17, CI, Cr)

603-L. Estimation of the Thermal Expansion of Enamels and Enamel Frits by the Stress-Optical Test. H. J. van Buren. *American Ceramic Society Bulletin,* v. 34, Aug. 1955, p. 261-263.

Expansion of a porcelain enamel glass determined by optically determining the stress in a standard glass which was fused to an enamel glass. Methods of preparing samples; optically measuring stress by the use of polarized light; calculating coefficients of expansion. Photograph, diagrams. (L27)

604-L. Selection of Paints and Application in Combating Atmospheric Corrosion. F. T. Radecke. *American Petroleum Institute, Proceedings,* sec. III. *Refining,* v. 34, 1954, p. 37-47; disc., p. 47-49.

Coatings and basic coating practices for petroleum refineries. Tables, photographs. (L26, R3)

605-L. Radiant Panels for Tin Reflow. G. J. Campbell. *American Society of Mechanical Engineers, Paper No.* 55—S-22, 1955, 8 p. + 3 plates.

Development of radiant gas-fired panels for fusing electrolytically deposited tin on strip. Photographs, diagrams. (L17, Sn)

606-L. Welding Variables and Hardfacing Deposits. I. A. Zvanut and V. Peters. *Canadian Metals,* v. 18, Aug. 1955, p. 56, 58.

Electrode types, analysis of deposits, base metal dilution. Tables. (To be continued.) (L24)

607-L. Electroplating in Western Germany. II. Electroplating, Electropolishing and Chemical Polishing Plant, Processes and Solutions. R. Pinner. *Electroplating and Metal Finishing,* v. 8, Aug. 1955, p. 277-283, 286.

Materials, equipment and procedures for chromium, copper, nickel and silver plating. Polishing of stainless steel, and copper and lead aluminum alloys. Photographs. 6 ref. (L17, L12, L13, Cr, Cu, Ni, Ag, SS, Al)

608-L. P.V.C. and Fibre Glass Processing Tanks in the Electroplating Industry. E. Martin. *Electroplating and Metal Finishing,* v. 8, Aug. 1955, p. 284-286.

Properties and manufacture of polyvinyl chloride. Examples of plastic plating tanks. Photographs. (L17)

609-L. Low Temperature Ceramic Coatings for Light Gauge Metal. *Finish,* v. 12, Sept. 1955, p. 36-39, 93-94.

Sheets up to 48 by 120 in. in size are pickled, coated with frit and fired at 950 to 1000° F. for use as chalk boards. Table, photographs, diagram. (L27, Al, ST)

610-L. Metal Coatings. Donald Price. *Industrial and Engineering Chemistry,* v. 47, Aug. 1955, p. 1511-1513.

Two ways in which molybdenum is utilized in the formation of protective or decorative coatings. Photographs. 18 ref. (L17, L14, Mo, Zn)

611-L. Magnesium Protection Methods for Missiles. Forrest Warren. *Light Metal Age,* v. 13, Aug. 1955, p. 14-15.

Use of organic coatings to protect Navy guided missiles from salt water and other forms of corrosion. Photographs. (L26, R4, Mg)

612-L. Aluminum Coating Processes. Arthur Q. Smith. *Light Metal Age,* v. 13, Aug. 1955, p. 16-18.

Two processes to achieve corrosion resistance through aluminum bonding and aluminum surface coating. Photographs. (L22, L24, Al)

613-L. New Protective Coating for Magnesium Alloys. *Light Metal Age,* v. 13, Aug. 1955, p. 22-23.

An alkaline chromate process for coating magnesium alloys offers possibility of high-level protection at less cost. Micrographs. (L14, Mg)

614-L. Araldite Coatings for Aluminium Containers. P. A. Dunn. *Light Metals,* v. 18, Aug. 1955, p. 258-261.

Use of flexible lacquer for coating inside of aluminum containers and collapsible tubes. Photographs, tables. (L26, Al)

615-L. Modern Concepts in the Protection of Magnesium Base Alloys. W. F. Higgins. *Light Metals,* v. 18, Aug. 1955, p. 264-267.

Problems encountered when painting magnesium and a few simple principles that can be applied to overcome most of the difficulties. (L26, Mg)

616-L. Plating Metal Powder Compacts. Charles C. Cohn. *Metal Industry,* v. 87, Aug. 12, 1955, p. 128-129, 134.

Factors which hinder the successful electrodeposition of coatings on metal powder compacts. Basic requirements for successful reduction of surface porosity; suitability of various protective coatings. (L17, L19, H general)

617-L. Improved Method for Applying Cermets. *National Bureau of Standards, Technical News Bulletin,* v. 39, Aug. 1955, p. 112-114.

Application by spraying a water suspension instead of the usual flame-spraying technique. Photographs, micrographs, table. (L27)

618-L. Epoxy Coatings Protect Copper and Brass. E. H. Christ. *Organic Finishing,* v. 16, Aug. 1955, p. 13-15.

Carefully buffed, cleaned, coated and baked products withstand a 2-min. concentrated nitric acid test. Photographs. (L26, Cu)

619-L. Precision Finishing in a Barrel. *Precision Metal Molding,* v. 13, Sept. 1955, p. 70-73, 92.

Processes involved in tumbling, parts that can be finished, types of finish, saving in costs, planning of the operation. Diagram, photographs. (L10)

620-L. Degreasing Systems and Their Choice. D. J. Fishlock. *Product Finishing,* v. 8, Aug. 1955, p. 48-56.

Methods available for degreasing the most commonly encountered metals reviewed, with particular emphasis upon the correct choice of degreasing method. Tables, photographs, graph, diagram. (To be continued.) (L12)

621-L. Electrodeposition of Heavy Nickel. II. D. J. Fishlock. *Product Finishing,* v. 8, July 1955, p. 66-74.

Solution control, anode types, bath compositions, production details. Graph, photographs, table, diagram. 7 ref. (L17, Ni)

622-L. Anodising Aluminium Chair Parts. *Product Finishing,* v. 8, Aug. 1955, p. 74-77.

Plant layout and process details. Advantages of the installation. Photographs, diagram. (L19, Al)

623-L. A Survey of the Literature on the Electrodeposition of Molybdenum. T. T. Campbell and A. Jones. *U. S. Bureau of Mines, Information Circular* 7723, July 1955, 6 p.

Deposition from aqueous and nonaqueous mediums; fused salt electrolysis. (L17, Mo)

624-L. (German.) **Effect of Mercury-Vapor Residues on the Diffusion of Silver in Thin Films of Tellurium or Selenium.** U. Zorll. *Annalen der Physik,* v. 16, nos. 1-2, 1955, p. 27-30.

Electron-refraction studies reveal that residual mercury reacts with tellurium or selenium during the process of vapor deposition. Possible methods of avoiding the distributing effect of such vapors. Diagrams. 6 ref. (L25, N1, Ag, Se, Te)

625-L. (German.) **The Properties of Activated Carbon.** G. Brinkmann. *Metalloberfläche,* Ausgabe A, v. 9, no. 8, Aug. 1955, p. 113-117.

Relationship between adsorption, chemisorption and porosity; effect of surface structure of activated carbon in aqueous solutions and dispersions; mechanism of carbon catalysis and use of activated carbon in electroplating. 16 ref. (L17, S19, C)

626-L. (German.) **Galvanic Coatings of Tin-Zinc Alloys.** J. W. Cuthbertson. *Metalloberfläche,* Ausgabe B, v. 9, no. 8, Aug. 1955, p. 113-116.

Conditions and procedure of electroplating metals with tin-zinc alloy; properties of the deposit; uses of the plated articles and parts. Graphs, photograph. (L17, Sn, Zn)

627-L. (German.) **Preliminary Surface Treatment and Lacquering of Sheet Metal in the Industrial Processing of Sheet Metal.** H. Anders. *Metalloberfläche,* Ausgabe B, v. 9, no. 8, Aug. 1955, p. 116-118.

Methods of cleaning sheet-metal surfaces by mechanical and chemical means and of applying protective lacquer coatings before shaping the sheet metal into containers. 6 ref. (L10, L12, L26)

628-L. (German and French.) **Modern Technique of Metal Spraying.** W. Baiker. *Zeitschrift für Schweisstechnik,* v. 45, no. 8, Aug. 1955, p. 163-173.

Spraying equipment; structures and properties of sprayed coatings. Industrial uses of metal spraying, including building-up of worn parts; manufacture of parts, molds and dies; coating of insulators with conducting metals. Diagrams, tables, photographs. (L23)

629-L. Electrolytic Oxidation of Zinc in Alkaline Solutions. Thedford P. Dirkse. *Electrochemical Society, Journal,* v. 102, Sept. 1955, p. 497-501.

Clarification of the reaction mechanism occurring during the discharge of alkaline batteries having zinc negative plates. It may also be the anodic reaction in alkaline zinc plating baths. Graphs. 4 ref. (L17, R1, Zn)

630-L. Anodic Polarization of Zirconium at Low Potentials. George B. Adams, Jr., Pierre Van Rysselberghe and Mario Maraghini. *Electrochemical Society, Journal,* v. 102, Sept. 1955, p. 502-511.

Methods for quantitative studies of the growth of very thin oxide films on zirconium and for estimating the film thickness as this growth progresses. Tables, graphs. 9 ref. (L19, Zr)

631-L. In-Plant Plating Moves Diversified Product Line Faster. W. G. Patton. *Iron Age,* v. 176, Sept. 1, 1955, p. 91-93.

A highly versatile zinc barrel plating system, suitable for some 1500 to 2000 different fittings, results in lower plating costs, reduced inventory and improved customer service. Photographs. (L17, Zn)

632-L. Rinse Tank Control. J. B. Mohler. *Metal Finishing,* v. 53, Sept. 1955, p. 66-68.

Efficiency of this phase is vital in face of current water costs and pollution problems. Graphs. 4 ref. (L17, L12)

633-L. Surface Treatment and Finishing of Light Metals. VII. Industrial Anodizing of Aluminum and Its Alloys. S. Wernick and R. Pinner. *Metal Finishing,* v. 53, Sept. 1955, p. 69-75.

Effects of alloying elements are usually undesirable. Anodizing equipment and processes. Table, graphs, photographs. 25 ref. (To be continued.) (L19, Al)

634-L. Methods of Coating Plastics With Metal. John Keating. *Metal Finishing,* v. 53, Sept. 1955, p. 76-78, 85.

Preparation and precautions for coating process and electroplating baths. (L23, L17, Ag, Cu)

635-L. Electrodeposition of Nickel From Fluoborate Solutions. III. C. B. F. Young and William Strobach. *Metal Finishing,* v. 53, Sept. 1955, p. 79-85.

Process is economically justified because it plates three times as fast with greater efficiency. Graph. (L17, Ni)

636-L. So—You're Going to Overhaul Your Turbine Generator! VI. Metallizing Turbine Shaft. *Power Engineering,* v. 59, Sept. 1955, p. 65-69.

Method of applying a hard layer of stainless steel, in form of continuous metal spray, on a turbine shaft. (L23, SS)

637-L. Alloy Plating. Robert T. Gore. *Product Engineering,* v. 26, Sept. 1955, p. 136-139.

Evaluation of available alloys and plating methods, properties, advantages and limitations and basic plating procedure for brass, some tin, nickel and silver alloys, and other compositions, some still in development. Discusses the copper-tin (bronze) alloy, a corrosion-resistant undercoating with better throwing power and higher rates of deposition than copper. Properties of the deposits, applications, and plating procedure. Photographs. (L17, Ag, Cu, Ni, Sn)

638-L. Automatic Polishing Speeds Production of Aluminum Trim Shapes. Paul C. Barber. *Products Finishing,* v. 19, Sept. 1955, p. 26-29.

Use of an automatic buffing machine to finish extruded aluminum parts. Application of bright anodizing to provide a more wear resistant surface. Photographs. (L10, L19, Al)

639-L. Recently Developed Anodize Coatings for Magnesium. Peter Zylstra. *Products Finishing,* v. 19, Sept. 1955, p. 30 + 5 pages.

Review of known facts about these anodize coatings and their uses. (L19, Mg)

640-L. Hot Dip Aluminum Coating Iron and Steel Wire. Bernard S. Westerman. *Products Finishing,* v. 19, Sept. 1955, p. 62 + 5 pages.

Characteristics of hot dipped aluminum coatings applied to wire offer substantial and significant advantages in extension of service life, corrosion and oxidation resistance. Diagram. (L16, Al, Fe, ST)

641-L. Finishing Systems for Aluminum Evaporators. R. V. Vanden Berg. *Refrigerating Engineering,* v. 63, Aug. 1955, p. 37 + 5 pages.

Anodizing methods and equipment, oxide coating properties. Micrographs, photographs, graphs. (L19, Al)

642-L. Abrasive Belt Polishing. II. Lee Vorce. *Steel,* v. 137, Sept. 12, 1955, p. 102-104.

Line and station concept automates belt finishing. Photograph. (To be continued.) (L10)

643-L. (Pamphlet.) **Research on Materials and Surface Coatings for Aircraft-Arresting Wire Rope and Hook Points.** R. J. MacDonald, J. K. Thompson, and G. K. Manning. Final Report. PB 117567. 18 p. 1954.

Library of Congress, Washington, D. C. Mimeograph $2.00. Photograph $2.75.

The following were tested: Colmonoy coating, flame-plated tungsten carbide, molybdenum disulfide, vapor and spray deposited tungsten and molybdenum, Elgiloy, and fiberglass combinations. (L general)

644-L. (Book.) **Steel Structures Painting Manual. Systems and Specifications.** Joseph Bigos, ed. v. II. 292 p. 1955. Steel Structures Painting Council, 4400 Fifth Ave., Pittsburgh 13, Pa.

Supplements volume one (which established general good practices) with specific recommendations for various types of steel structures. Contains specifications for surface preparation, pretreatment, application, paint systems, and specific paints. (L26, ST)

645-L. (English.) **Some Recent Research Results of the A.B.E.M. Corrosion Committee.** M. Van Rysselberge and D. Bermane. *Acier, Stahl, Steel,* v. 20, no. 7-8, July-Aug. 1955, p. 317-320.

Provisional tests indicate that with improved vehicles on a synthetic resin basis and multiple pigments including zinc chromate, white lead, or, for particular uses, zinc dust, will enable paints to be produced having a protective quality at least equal, if not greatly superior, to the traditional paint compounds based on linseed oil and red lead. Tables, graphs. 16 ref. (L26, ST)

M

Metallography, Constitution and Primary Structures

264-M. An Electron Diffraction Study to Determine the Oxide Form Produced in Oxidized Molten Iron. Nobutaro Kayama. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 6-8.

In the oxidized iron, SiO_2, as an inclusion, increased up to about 0.05%, although iron oxide did not increase more than 0.02%. The silica was present as alpha-crystobalite in free state, and not a component of a silicate. Tables, diffraction patterns. 2 ref. (M27, CI)

265-M. Research on the Aluminium-Silicon-Zinc System Alloys for Castings. IV. Shigeo Oya. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 27-30.

Effects of minor amounts of alloying constituents on microstructure and tensile strength. Tables, graphs, micrographs. (M27, Q23, Al)

266-M. The Principal Design and Construction Features of a Recent X-Ray Diffraction Unit. R. I. Garrod, C. M. Chamberlain and K. A. Gross. *Commonwealth of Australia, Dept. of Supply, Defence Standards Laboratories Report* 210, Dec. 1954, 16 p. + 3 plates.

Principal design factors that have been taken into consideration and construction and performance of the unit. Photographs, diagrams. 9 ref. (M22)

267-M. An Investigation of the General Metallurgy of Aluminum-Base Aircraft Alloys. Walter F. Heller and James M. Thompson. *General Motors Engineering Journal,* v. 2, July-Aug. 1955, p. 26-30.

Effects of underheating and overheating on microstructures of the various alloys and effects of the different thermal and aging treatments used. Tables, micrographs. (M27, J general, Al)

268-M. A Spectrometer for Single Crystal Neutron Diffraction. G. E. Bacon and R. F. Dyer. *Journal of Scientific Instruments,* v. 32, July 1955, p. 256-257.

Description of an instrument for neutron crystallography, specially designed for measurements with single crystals. The small size is in marked contrast with that of the conventional spectrometers designed for powder diffraction methods. Photograph, graph. 5 ref. (M22)

269-M. Fields Around Impurity Atoms in Metals. L. C. R. Alfred and N. H. March. *Philosophical Magazine,* v. 46, 7th ser., no. 378, July 1955, p. 759-768.

Calculations of the potential around atoms with valency $Z + 1$ dissolved in a monovalent metal. Graphs. 5 ref. (M25)

270-M. Atomic Arrangements in Close-Packed Structures. Lester W. Strock. *Sylvania Technologist,* v. 8, July 1955, p. 71-76.

General features of close-packed structures described, with zinc sulfide as a model. Subject of polytypes introduced, and these structures, as well as the more common forms of zinc sulfide, illustrated. Photographs, diagrams. 7 ref. (M25, Zn)

271-M. The Solubility of Beryllium in Liquid Gallium, Tin and Indium, and the Phase Diagrams of Beryllium With These Metals. Reed O. Elliott and Eugene M. Cramer. *U. S. Atomic Energy Commission, AECU*-3022, 1952, 10 p.

Determined between 540 and 1200° C. All three diagrams are characterized by a wide miscibility gap in the liquid state, an absence of intermediate phases, and no detectable solid-state solubility. A monotectic was found in the beryllium-gallium system. No evidence for a eutectic was found in any of the systems. Tables, graphs, micrographs. 4 ref. (M24, P13, Be, Ge, Sn, In)

272-M. (French.) **The Alloys of Iron With Palladium and Platinum. Critical Examination of Publications on the Subject.** J. R. Knight and E. C. Rhodes. *Revue de métallurgie,* v. 52, no. 7, July 1955, p. 518-528.

Critically reviews the constitution diagrams of these alloys derived from experiments relating to their magnetic, electric and physical properties. High coercivity can be reached with certain iron-platinum compositions. Positive magnetostriction with iron-palladium and iron-platinum alloys. Tables, graphs, phase diagrams. 43 ref. (M24, P16, Fe, Pd, Pt)

273-M. (German.) **The Ternary Iron-Cobalt-Vanadium System. II. Formation of the Ternary System Under Equilibrium Between Alpha-Gamma Solid Solutions.** Werner Köster and Heinz Schmid. *Archiv für das Eisenhüttenwesen,* v. 26, no. 7, July 1955, p. 421-425.

Structural changes resulting from heat treating the alloys up to one year; change of physical properties due to the effects of equilibrium between alpha and gamma solid solutions; study of reaction pattern by measuring hardness, specific resistance and coercive force as a function of heat treating time and temperature. Photographs, graphs, phase diagrams, micrographs. 7 ref. (M24, P general, Fe, Co, V)

274-M. (German.) **Structure Formation of Fine Zinc Alloys in the Chill Mold.** K. Ruttewit and E. Eichmeyer. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 662-666.

Experiments with different casting temperatures, chill-mold temperatures, and chill-mold wall thicknesses to study effect of cooling rate on structures at different places of various zinc-alloy castings. Tables, graphs, diagrams, micrographs. (M27, E25, Zn)

275-M. (German.) **Gold-Platinum-Palladium Alloys.** Ernst Raub and Georg Wörwag. *Zeitschrift für Metallkunde,* v. 46, no. 7, July 1955, p. 513-515.

X-ray investigation of the ternary system and some of the binary alloys, gold-platinum and platinum-palladium. Tables, graphs, phase diagrams. 4 ref. (M26, Au, Pd, Pt)

276-M. (Italian.) **Preparing Metallic Monocrystals.** A. Ferri. *Metallurgia italiana,* v. 47, no. 6, June 1955, p. 251-258.

Bibliographic survey of four different methods—equipment and method for making zinc, copper and silicon monocrystals. Graphs, diagrams, photographs. 15 ref. (M26, N5, N12, Ag, Cu, Zn)

277-M. (Italian.) **A System for the Elimination of Absorption Errors in X-Ray Investigation With Debye-Scherrer Cylindrical Chambers.** Vladimiro Scatturin, Maria Tornati and Roberto Zannetii. *Ricerca scientifica,* v. 25, no. 6, June 1955, p. 1447-1460.

Use of diluting powders to obtain corrections for fractional error in interplanar distances. Tables, graphs. 13 ref. (M22)

278-M. The Structure of Silver Electrodeposited From the Argentocyanide Bath on to Silver (110), (100) and (111) Faces. T. H. V. Setty and H. Wilman. *Faraday Society, Transactions,* v. 51, July 1955, p. 984-995 + 2 plates.

Electron diffraction used to study systematically the surface structure of silver electrodeposited on electropolished faces of a silver single crystal. Micrographs, graphs. 6 ref. (M27, M22, L17, Ag)

279-M. The System Uranium-Titanium. A. G. Knapton. *Institute of Metals, Journal,* v. 83, Aug. 1955, p. 497-504.

Showed a smooth increase from the melting point of uranium to that of titanium. A continuous series of solid solutions is formed between the gamma-modification of uranium and beta-modification of titanium. Two eutectoids form. Table, graph, phase diagrams. 13 ref. (M24, Ti, U)

280-M. Electronic Energy Bands in Iron. Joseph Callaway. *Physical Review,* v. 99, ser. 2, July 15, 1955, p. 500-509.

Calculation of energy band structure of valence electrons. Application of results to energy band theory of ferromagnetism. Diagram, graphs, tables. 23 ref. (M25, P16, Fe)

281-M. Crystalline Microstructure and Athermic Plasticity of Hard Materials. Adolph G. Smekal. *Powder Metallurgy Bulletin,* v. 7, Aug. 1955, p. 42-47.

Investigation of several carbides to demonstrate the relationship between the crystalline substance and the foreign matter of "real crystals". Micrographs. 8 ref. (M26, Q23, D-n)

282-M. Metallurgical Aspects of Microscopy. B. W. Mott. *Research,* v. 8, Aug. 1955, p. 307-313.

Recent developments in use of phase contrast, polarized light and interferometry. Diagram, micrographs. 42 ref. (M21)

283-M. Continuous Distribution of Dislocations: A New Application of the Methods of Non-Riemannian Geometry. B. A. Bilby, R. Bullough, and E. Smith. *Royal Society, Proceedings,* v. 231, ser. A, Aug. 22, 1955, p. 263-273.

Theoretical development of a point of reference for defining Burgers circuits. 18 ref. (M26)

284-M. Intermetallic Compounds Between Lithium and Lead. I. The Structures of Li_3Pb and Li_7Pb_2. Allan Zalkin and William J. Ramsey. *University of California Radiation Laboratory (U. S. Atomic Energy Commission),* UCRL 4508, May 1955, 16 p.

Structure of Li_3Pb is face-centered cubic, Li_7Pb_2 is hexagonal. Tables, diagrams. 12 ref. (M26, Li, Pb)

285-M. Effect of the Basic Arc Furnace Practice Upon the Nonmetallic Inclusion Content. H. Ishizuka. *Henry Brutcher Translation No.* 3430, 19 p. (From *Tetsu-to-Hagané,* v. 37, no. 7, 1951, p. 397-404.) Henry Brutcher, Altadena, Calif.

Microscopic study of nonmetallic inclusions in 0.85% carbon, 1.6 to 1.8% chromium, and 0.95 to 1.10% carbon, 1.0 to 1.5% chromium steels. Effect of operating variables on inclusion content. Graphs. 17 ref. (M27, D5, AY)

286-M. X-Ray Study of Fracture Faces of Impact Test Bars. M. P. Zheldak. *Henry Brutcher Translation No.* 3435, 5 p. (From *Doklady Akademii Nauk SSSR,* v. 83, no. 6, 1952, p. 843-845.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 295-M, 1952. (M22, Q6, AY)

287-M. (Czech.) **Relation of Alpha and Sigma Phase in Manganese-Chromium Austenitic Steels and Distinctions Made Between These Phases by Means of Magnetic Suspension.** V. Havel and M. Zezulova. *Hutnické Listy,* v. 10, no. 7, July 1955, p. 400-403 + 2 plates.

Study of the presence and distribution of the phases in austenite and reversibility of the phases alpha $\rightleftharpoons$ sigma. Micrographs. 12 ref. (M27, SS)

288-M. (French.) **Preparation of Polycrystalline Specimens of Iron of Different Degrees of Purity in the Polygonal Crystal Form.** Jean Montuelle. *Comptes rendus,* v. 241, no. 2, July 11, 1955, p. 204-205.

Purification of iron by zone melting. Micrograph, diagram. 2 ref. (M23, D8, Fe)

289-M. (German.) **Constitutional Diagram of Iron-Iron Phosphide (Fe_2P)-Tungsten Phosphide (WP)-Tungsten.** Reinhard Schneider and Rudolf Vogel. *Archiv für das Eisenhüttenwesen,* v. 26, no. 8, Aug. 1955, p. 483-490.

Microscopic and thermal investigation of the ternary system iron-phosphorus-tungsten with phosphorus up to 22% and tungsten up to 100%. Diagrams, tables, graphs, micrographs. 13 ref. (M24, Fe, P, W)

290-M. (German.) **Detection of Dislocations in the Reduction of Tungsten, Tantalum, and Nickel Monocrystals.** M. Drechsler, G. Pankow and R. Vanselow. *Zeitschrift für physikalische Chemie (Frankfurt),* v. 4, nos. 5-6, July 1955, p. 249-263.

Several methods of gradually reducing monocrystal tips by field emission microscopes at elevated temperature and in the electric field. Micrographs, diagrams. 17 ref. (M26, Ni, Ta, W)

291-M. Alloys of Uranium and Thorium. P. C. L. Pfeil. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/416, July 1955, 7 p.

Factors affecting constitution and properties of these alloys may serve as a guide of likely behavior of other heavy metals. Graphs. 21 ref. (M general, Q general, Th, U)

292-M. Distribution and Diffusion of Components in Metal Alloys Studied by the Autoradiographic Method. S. T. Kishkin and S. Z. Bokstein. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/703, July 1955, 29 p. (Translated from the Russian.)

Autoradiographic techniques permit direct and local study of structure and properties of real bodies, furnish qualitative and quantitative picture of distribution made of elements in alloy, assist in quantitative solution of the diffusion problem along grain boundaries and within the crystal and serve as a means of understanding mechanism of influence of minor impurities. Table, graphs, micrographs, photographs, diagrams. 18 ref. (M23, Ni)

293-M. Metal-Research "Hot Laboratory". N. F. Pravdjuk. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/673, July 1955, 28 p. (Translated from the Russian.)

Changes in structure and physical and mechanical properties of various structural and fissionable materials irradiated in reactors. Table, diagrams, micrograph, photographs, graphs. (M27, P general, Q general)

294-M. An Electron Diffraction Study of the Structure of Electrodeposited Nickel. I. B. C. Banerjee and A. Goswami. *Journal of Scientific & Industrial Research,* v. 14, sec. B, July 1955, p. 322-324 + 1 plate.

Structure and orientation of electrodeposited nickel from a sulfate-boric acid bath studied under varying conditions of *p*H, temperature and current density. Conditions which affect the crystal structure and orientation and the mode of growth of the deposit, determined. Table, micrographs. 7 ref. (M26, L17, Ni)

295-M. (English.) **Dislocation Energies in Anisotropic Crystals.** A. J. E. Foreman. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 322-330.

Detailed calculation of the elastic energy of a straight dislocation in a cubic or hexagonal crystal, for various orientations in the crystal of the dislocation line and its Burgers vector. Tables, graphs. 15 ref. (M26, P12)

296-M. (English.) **Anomalous Lattice Spacings Caused by Stacking Disorder.** Hiroshi Nimura. *Physical Society of Japan, Journal,* v. 10, no. 8, Aug. 1955, p. 642-646.

Electron diffraction of evaporated crystallites of gold and silver shows a deviation of 0.17% from the cubic formula while aluminum shows no deviation. Tables, graphs, diagram. 6 ref. (M26, Ag, Al, Au)

297-M. (English.) **On the Structure of the X-Ray Non-Diagram Lines *K Beta n* for Elements From Cr(24) to Zn(30).** Masao Sawada, Kenjiro Tsutsumi, Toshio Shiraiwa and Masayoshi Obashi. *Physical Society of Japan, Journal,* v. 10, no. 8, Aug. 1955, p. 647-650.

Ascribes the origin of these lines to the two-electron jump between the double-hole levels based on wave length positions. Tables, spectrograms. 7 ref. (M22, Co, Cr, Cu, Fe, Ni, Zn)

298-M. (English.) **The Interpretation of Etch Patterns on Aluminium.** A. J. Forty and F. C. Frank. *Physical Society of Japan, Journal,* v. 10, no. 8, Aug. 1955, p. 656-663.

Study of etch patterns on polycrystals of "super-purity" aluminum suggests that an etch pit is produced only where a precipitate of impurity is present in the surface which are located on dislocations and can be regarded as an indirect cause of etching. Micrographs. 7 ref. (M21, Al)

299-M. (English.) **The Velocity of Dislocations.** J. S. Koehler. *Physical Society of Japan, Journal,* v. 10, no. 8, Aug. 1955, p. 669-672.

Study shows that the potential energy of a dislocation is in general more than a hundred times the kinetic energy. Indicates that the rate of glide is decreased by a factor of about 50 during the production of a single slip band in aluminum. Present data also indicates that twinning requires rapid dislocations whereas slip seems to demand slow dislocations. Diagrams. 13 ref. (M26, Q24)

300-M. (English.) **The Migration of Solute Atoms to Dislocation Arrays.** B. A. Bilby. *Physical Society of Japan, Journal,* v. 10, no. 8, Aug. 1955, p. 673-679.

Considers a model which allows for diffusion, for competition for the solute atoms between arrays or between isolated dislocations. Graphs, diagrams. 8 ref. (M26)

301-M. (English.) **On the Theory of the Kirkendall Effect.** Frederick Seitz. *Physical Society of Japan, Journal,* v. 10, no. 8, Aug. 1955, p. 679-685.

Nature of the lattice defects which are responsible for transport of atoms in metals, Kirkendall effect is restated. 15 ref. (M26)

302-M. (French.) **Study of Crystalline Structure Using the Emission Electron Microscope.** E. Louis Huguenin. *Comptes rendus,* v. 241, no. 3, July 18, 1955, p. 307-309 + 1 plate.

Use of the electron microscope to study the Beilby layer. Diagram, micrographs. 2 ref. (M26, M21)

303-M. (German.) **Estimating the Thickness of the Beilby Layer.** Shigeto Yamaguchi. *Zeitschrift für Physik,* v. 140, no. 6, 1955, p. 577-580.

Estimating film thickness on stainless steel by using the oxide-film replica process. Analysis of refraction diagrams. Micrographs, diagrams. 11 ref. (M21, SS)

304-M. (Russian.) **X-Ray Method of Structural Analysis by Means of a Narrow Beam of Rays.** B. A. Movchan. *Zavodskaia Laboratoriia,* v. 21, no. 6, June 1955, p. 699-702.

Design and operation of X-ray apparatus, advantages of the method, field of application. Photographs, diagram. 1 ref. (M22)

305-M. (Russian.) **Reagent for Exposing Free Cementite and Segregation of Phosphorus in Carbon Steels and Cast Irons.** Kh. I. Rabinovich. *Zavodskaia Laboratoriia,* v. 21, no. 6, June 1955, p. 708-710.

Composition of the etching agent, preparation of the specimens. Micrographs. 1 ref. (M21, CI, CN)

306-M. (Russian.) **Graphic-Analytical Treatment of Dilatometric Curves.** M. M. Levitan. *Zavodskaia Laboratoriia,*

v. 21, no. 6, June 1955, p. 712-716 + 1 plate.

Method for quantitative evaluation of volumetric changes, connected with transformation during heating and cooling, based on the value of elongation and its intensity. Graphs, micrographs. (M23)

307-M. (Russian.) **Use of Radiographic Method for Investigating the Structure of Magnesium Alloys.** M. E. Drits, Z. A. Sviderskaia, and E. S. Kadaner. *Zavodskaia Laboratoriia,* v. 21, no. 7, July 1955, p. 831-833 + 2 plates.

Macro and microstructures (dendritic and other formations) of two to four-component magnesium alloys, after casting and annealing. Micrographs. 1 ref. (M27, M28, N12, Mg)

308-M. (Russian.) **Radiographic Method of Studying Non-Metallic Inclusions in Copper and Its Alloys.** M. V. Pikunov. *Zavodskaia Laboratoriia,* v. 21, no. 7, July 1955, p. 833-834.

Use of radioactive isotopes of calcium, tin zinc and beryllium. (M23, M27, Cu)

309-M. (Book.) **Theoretical Structural Metallurgy.** A. H. Cottrell. 2nd Ed. 251 p. 1955. St. Martin's Press Inc., 103 Park Ave., New York 17, N. Y. $4.50.

Atomic structure; theory of crystals; equilibrium states; diffusion; transformations; shear processes. (M25, M26, N general)

N

Transformations and Resulting Structures

324-N. **The Welding Phenomena Between Solid and Molten Cast Iron.** Tsunemitsu Muraki. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 42-48.

Studies of the interaction between solid steel and molten cast iron. Tables, graphs, diagram, micrographs. (N1, N12, CI, ST)

325-N. **On the Distribution of Impurity in Crystals Grown From Impure Unstirred Melts.** K. F. Hulme. *Physical Society, Proceedings,* v. 68, no. 427B, July 1955, p. 393-399.

Problem of how rapidly a boundary layer of different impurity concentration attains its final form in the case of growth into an infinite unstirred melt is shown to be capable of exact solution for all values of the segregation constant. Diagrams, graph. 4 ref. (N12)

326-N. (English.) **An Approximation Method for Order-Disorder Problems. I-II-III.** J. Hijmans and J. De Boer. *Physica,* v. 21, no. 6, June 1955, p. 471-516.

Each approximation is characterized by the choice of a certain basic figure and by the distribution of figures of this type in the lattice over their different configurations. A set of independent macrovariables is introduced to facilitate the minimizing procedure. The method is applied to a triangular lattice with a triangle and a rhombus as the basic figure. Tables, diagrams. 22 ref. (N10)

327-N. (French.) **Calculation of the Diffusion Rate of Hydrogen Through a Nickel Plate.** E. Thomas. *Vide,* v. 10, no. 57, May-June 1955, p. 71-77.

C. J. Smithell's formula applied to a 1 mm. plate from 700 to 1500° K. at various pressures. Tables, graphs. 5 ref. (N1, Ni)

328-N. (German.) **Recrystallization Characteristics of an Al-Mn Alloy.** W. Rosenkranz. *Aluminium,* v. 31, nos. 7-8, July-Aug. 1955, p. 328-334.

Response of alloys containing chromium and manganese to annealing depends strongly on their structure. The effects of a 24-hr. homogenizing anneal at 600° C. on the grain size of an ingot of an aluminum-manganese alloy have been studied. The annealed alloy recrystallizes even during hot-shaping at 550° C. with coarse grain. Micrographs, photographs. 5 ref. (N5, J23, Al, Mn)

329-N. (Czech.) **Graphite Shape in Spheroidal Cast Iron.** Marie Kralova and Jiri Klaban. Slévarenstvi, v. 3, no. 7; *Prace Ceskoslovenského Vyzkumu Slévarenského,* v. 2, no. 20, July 1955, p. 27-30.

Graphite shape, reconstructed by a series of metallographic sections, precipitated in forms not corresponding to a crystallographic form. Description of precipitation of particles in different positions of graphitic grain section is given. Micrographs, diagrams. 11 ref. (N8, N7, CI)

330-N. (French.) **Application of Radioactive Tracers in the Study of Self-diffusion in Volume at the Boundaries of Metal Grains.** Claude Leymonie and Paul Lacombe. *Métaux, Corrosion-Industries,* v. 30, no. 358, June 1955, p. 231-242.

Intergranular diffusion, critical analysis of existing methods of study, description and technique used in radioactive tracer method. Tables, graphs, diagrams. 64 ref. (N1, S19)

331-N. (French.) **Structure and Allotropic Transformation of Cobalt.** Hervé Bibring and Francois Sebilleau. *Revue de métallurgie,* v. 52, no. 7, July 1955, p. 569-578; disc., p. 578.

Recrystallization of a cold worked cobalt specimen occurs at a lower temperature and in different ways than that of the allotropic transformation; mechanism of transformation to cubic phase can be defined. Graphs, diagram, photograph, micrographs. 4 ref. (N6, N5, Co)

332-N. (German.) **The Solution of Carbon in Molten Iron.** Olaf Dahlke and Ottmar Knacke. *Archiv für das Eisenhüttenwesen,* v. 26, no. 7, July 1955, p. 373-378.

Effect of temperature, type of crucible and bath agitation on the rate of solubility. Micrographs, photographs, diagrams, graphs. 7 ref. (N12, Fe)

333-N. (German.) **Investigation of Quench Aging of Soft Unalloyed Steels With Radioactive Isotopes, Especially Carbon-14.** Hans-Kurt Görlich, Hans Goossens, and Hermann Schenck. *Archiv für das Eisenhüttenwesen,* v. 26, no. 7, July 1955, p. 389-391.

New method of studying processes of quench aging; discussion of possible errors; comparison of photomicrographs with radiation pictures. Tables, micrographs. 7 ref. (N7, J27 M23, CN)

334-N. (German.) **Experiments on the Relationship of Technological Properties and Transformation Structures of Steel Wires.** Hans Schlacher, Jr. *Berg und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 100, no. 5, May 1955, p. 166-170.

Effect of two special methods of heat treating on the mechanical properties and structures of steel wires. Graphs, micrographs, tables. 6 ref. (N8, J general, Q general, M general, ST)

335-N. (German.) **The Hardness of Rolled Fine Zinc With Low Magnesium Contents.** K. Claus and K. Löhberg. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 670-673.

Effect of magnesium content, degree of rolling, aging temperature and solution heat treatment on the age-hardening of zinc. Graphs. 3 ref. (N7, F23, Zn)

336-N. (German.) **The Absorption of Hydrogen by Lead and Lead Alloys With Magnesium and Calcium.** W. Mannchen and M. Baumann. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 686-688.

Solubility of hydrogen in lead is increased by presence of alloying constituents. Diagram, graphs, tables. 2 ref. (N12, Pb)

337-N. (German.) **Solubility of Copper, Nickel, and Cobalt in Molten Lead.** E. Pelzel. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 692-694.

Formation of equilibrium in supersaturated lead-copper, lead-nickel and lead-cobalt alloys at different temperatures, analytical determination of the concentration of the quenched saturated alloy, computation of entropy of fusion from the resulting solubility curves. Micrographs, tables, graphs. 10 ref. (N12, P12, Pb)

338-N. (German.) **Grain Refining of Aluminum.** Wolfgang Thury. *Zeitschrift für Metallkunde,* v. 46, no. 7, July 1955, p. 488-490.

Nucleation, influence of titanium carbide, aluminum diboride and titanium diboride on pure aluminum and its alloys. Tables. 7 ref. (N2, Al)

339-N. (German.) **Sharp and Diffused X-Ray Interference in the Case of Age Hardening.** Heinz Jagodzinski. *Zeitschrift für Metallkunde,* v. 46, no. 7, July 1955, p. 491-499.

Computation of diffused interference by integration into particle dispersion and interaction terms. Discussion of other computation methods. Diagrams. 14 ref. (N7)

340-N. (German.) **Behavior and Diffusion of Sulfur in Nickel.** Irmtraud Pfeiffer. *Zeitschrift für Metallkunde,* v. 46, no. 7, July 1955, p. 516-520.

Sulfur content and brittleness of nickel; determination of diffusion coefficient of sulfur at 1000, 1100 and 1200° C. and the activation energy of the process. Tables, graphs, micrographs. 8 ref. (N1, Q23, Ni, S)

341-N. (Russian.) **Investigation of Iron Diffusion in Iron-Molybdenum Alloys.** M. B. Neiman and A. Ia. Shiniaev. *Doklady Akademii Nauk SSSR,* v. 103, no. 1, July 1, 1955, p. 101-104.

Coefficient of iron diffusion, determined at 1106, 1148 and 1183° C., decreases sharply with increase of molybdenum content in an alloy, reaching a minimum corresponding to the chemical compound Fe_3Mo_2. Graphs. 5 ref. (N1, Fe, Mo)

342-N. **A Method of Examining Structural Changes of Metals on Deformation in Liquid Helium: Examination of Indium.** W. B. Pearson. *Canadian Journal of Physics,* v. 33, Aug. 1955, p. 473-475.

Debye-Scherrer type of X-ray camera described in which a soft metal can be deformed by extension and photographed *in situ* in liquid helium. Diagrams, 2 ref. (N general, Q24, M23, In)

343-N. Some Observations on Constitutional Changes in Copper-Aluminium Alloys at Temperatures Below That of the Beta $\rightleftharpoons$ Alpha + $Gamma_2$ Eutectoid. D. R. F. West and D. Lloyd Thomas. *Institute of Metals, Journal,* v. 83, Aug. 1955, p. 505-507.

Evidence indicates an additional phase forms by prolonged annealing of alloys containing 8.7 to 16.5% aluminum at temperatures in the range 340 to 400° C. Phase diagram. 7 ref. (N6, M24, Al, Cu)

344-N. Tracer Diffusion of Iron in Stainless Steel. V. Linnenbom, M. Tetenbaum and C. Cheek. *Journal of Applied Physics,* v. 26, Aug. 1955, p. 932-936.

Measurements over a wide temperature range by the surface activity decrease method, using radioactive iron-55. Equation for lattice diffusion coefficients. Tables, graph. 17 ref. (N1, M26, Fe, SS)

345-N. Sputtering of Metal Single Crystals by Ion Bombardment. Gottfried K. Wehner. *Journal of Applied Physics,* v. 26, Aug. 1955, p. 1056-1057.

Mercury sputtering of tungsten and silver single crystals. Structure of deposits. Photographs, micrographs. 2 ref. (N15, L25, Ag, Hg, W)

346-N. Magnetic Transformation in MnBi. R. R. Heikes. *Physical Review,* v. 99, ser. 2, July 15, 1955, p. 446-447.

Manganese-bismuth loses its spontaneous magnetization very sharply at 663° K. At the same temperature, drastic changes occur in the lattice constants. Graphs, table, 3 ref. (N11, P16, Mn, Bi)

347-N. Effect of Pretreatment of Martensite on Subsequent Graphitization at 1200° F. G. V. Smith, E. J. Dulis and B. W. Royle. *Welding Journal,* v. 34, Aug. 1955, p. 374S-378S.

Results of investigations suggesting a possible relation between the high susceptibility of martensite to graphitization and the transition from epsilon carbide to cementite. Micrographs, graph. 8 ref. (N8, CN)

348-N. New Data on Transformation of Pearlite Into Austenite, in Plain Carbon Steel During Electric Heating. Yu. A. Kocherzhinskii. *Henry Brutcher Translation No.* 3541, 4 p. (From *Doklady Akademii Nauk SSSR,* v. 100, no. 6, 1955, p. 1077-78.) Henry Brutcher, Altadena, Calif.

Comparison of dilatometric and thermal analysis curves for coarse pearlite heated at rates of up to 200° C. (360° F.) per sec. Graphs. 4 ref. (N8, CN)

349-N. Solubility of Oxygen in Liquid Iron Containing Titanium. B. K. Lyaudis and A. M. Samarin. *Henry Brutcher Translation No.* 3545, 4 p. (From *Doklady Akademii Nauk SSSR,* v. 101, no. 2, 1955, p. 325-326.) Henry Brutcher, Altadena, Calif.

Numerical data on solubility of oxygen in liquid iron and titanium at 1600° C. (2910° F.) and 1650° C. (3000° F.) Predominant reaction in the deoxidation of liquid iron with titanium, if up to 0.04% titanium is present in the melt. Table. (N12, Fe)

350-N. Recrystallization Diagram for Iodide Titanium. E. M. Savitskii, M. A. Tylkina and A. N. Turanskaya. *Henry Brutcher Translation No.* 3556, 5 p. (From *Doklady Akademii Nauk SSSR,* v. 101, no. 5, 1955, p. 857-859.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 235-N, 1955. (N5, Ti)

351-N. Investigation of Interdiffusion of Titanium and Columbium Borides. G. V. Samsonov and V. S. Neshpor. *Henry Brutcher Translation No.* 3557, 5 p. (From *Doklady Akademii Nauk SSSR,* v. 101, no. 5, 1955, p. 899-900.) Henry Brutcher, Altadena, Calif.

X-ray study of mutual diffusion of TiB_2 and CbB_2 in 50-50 mol % mixture at 1400, 1600 and 1800° C. for periods of ½ to 32 hr. Graph. 6 ref. (N1, SG-j)

352-N. (English.) **Hydrogen Occlusion and Equilibrium Hydrogen Pressure in Steel During Electrolytic Charging.** F. de Kazinczy. *Jernkontorets Annaler,* v. 139, no. 7, 1955, p. 466-480.

Relation between hydrogen flow through steel and current density, equilibrium pressure of hydrogen in steel. Formation of blisters in steel determined by equilibrium hydrogen pressure. Tables, graphs. 17 ref. (N1, H, ST)

353-N. (Czech.) **Two Types of Pearlitic and Ferritic Reactions in Alloy Steels.** Josef Cadek. *Hutnické Listy,* v. 10, no. 7, July 1955, p. 409-414.

Experiments to determine low-temperature pearlitic reaction. Graphs. 6 ref. (N8, AY)

354-N. (German.) **Diffusion of Silver in Selenium.** Gerhard Kienel. *Annalen der Physik,* v. 16, nos. 1-2, 1955, p. 1-6.

Determination at 20° C. of tarnishing constants of binary films of various thicknesses. Diagrams, micrographs, table. 6 ref. (N1, Ag, Se)

355-N. (German.) **Electron-Diffraction Investigations of Diffusion Phenomena in Thin Silver-Selenium Films.** U. Zorll. *Annalen der Physik,* v. 16, nos. 1-2, 1955, p. 7-26.

Electron-diffraction studies of thin selenium films vapor-deposited on a relatively thick layer of silver reveals Ag_2Se compound with "pseudo-cubic" lattice structure of low symmetry which changes, above 130° C., into the strictly cubic body-centered lattice of the high-temperature Ag_2Se modification. Photographs, diagrams, graphs, tables, micrographs. 16 ref. (N1, Ag, Se)

356-N. (German.) **Magnetic Determination of the Form of Coherence Ranges in the Precipitation of Supersaturated Copper-Iron Solid Solutions.** A. Knappwost. *Zeitschrift für physikalische Chemie (Frankfurt),* v. 4, nos. 5-6, July 1955, p. 364-375.

Preparation and heat treatment of copper-iron monocrystals; mathematics of quasi-paramagnetic susceptibility and demagnetization factor; effect of orientation on the quasi-paramagnetic susceptibility; demagnetization factor of the cumuli. Graphs, diagrams. 22 ref. (N7, P16, Cu, Fe)

357-N. Investigations of Diffusion and Atomic Interaction in Alloys With the Aid of Radioactive Isotopes. G. V. Kurdiumov. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/702, June 1955, 13 p. (Translated from the Russian.)

Determination of atoms in solid solutions and influence of alloying elements on properties of alloys by diffusion studies. Graphs. 40 ref. (N1)

358-N. The Solid State Reaction Between Uranium and Aluminium. R. Kiessling. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/786, July 1955, 13 p.

Studies made because of interest in aluminum as a canning material for uranium rods in a reactor. Intermediary phases discussed. Tables, micrographs, graph. 4 ref. (N general, U, Al)

359-N. Kinetics of the Phase Transition in Superconductors. T. E. Faber and A. B. Pippard. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 159-183.

A model of the superconducting state, nucleation, propagation, elimination of trapped flux. Graphs, diagrams. 25 ref. (N6, N2, P15)

360-N. (English.) **Isothermal Decomposition Kinetics of Transformed-Beta Phase in a Titanium-Nickel Alloy.** D. H. Polonis and J. Gordon Parr. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 307-311.

Proposes a model for the tempering kinetics of transformed beta phase in a 7.2% nickel alloy, based on growth of plates of Ti_2Ni during isothermal heat treatments between 450 and 550° C. Micrographs, graphs, diagram, table. 13 ref. (N6, N7, Ni, Ti)

361-N. (English.) **On the Interpretation of "Low-Temperature" Recovery Phenomena in Cold-Worked Metals.** A. S. Nowick. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 312-321.

Survey of the phenomena carried out to determine to what extent effects due to point defects and dislocations may be separated from one another. Recovery is interpreted as a super position of elementary first-order processes, each having a unique recovery time. Tables, graphs. 56 ref. (N4, M26, J23)

362-N. (English.) **A Growth Mechanism for Mercury Whiskers.** G. W. Sears. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 361-366.

Very fine whiskers of solid mercury, grown by condensation of the vapor on a glass surface, have a single imperfection, an axial screw dislocation, which accounts for their morphology. Diagrams. 17 ref. (N16, M26, Hg)

363-N. (English.) **A Mechanism of Whisker Growth.** G. W. Sears. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 367-369.

Growth of fine whiskers of zinc, cadmium, silver and cadmium sulfide on pyrex and quartz glass substrates by vapor deposition. Table, diagram. 7 ref. (N16, M26, Ag, Cd, Zn)

364-N. (English.) **Stored Energy and Recrystallization.** H. L. Walker and D. L. Bhattacharya. *Indian Institute of Science, Journal,* v. 37, sec. B, July 1955, p. 179-185.

Parabolic relation between stored energy and magnitude of the deformation is suggested and a formula relating recrystallized grain size with deformation is derived which agrees with the empirical rule formulated by Walker. Graph. 5 ref. (N5, P12, Q24)

365-N. (French.) **Relation Between Structures and Properties During Age Hardening in Al-Ag Alloys.** B. Belbeoch and A. Guinier. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 370-379.

Variations of hardness during age hardening correlated with structure variations studied with small-angle X-ray scattering. Photographs, tables, graphs. 10 ref. (N7, J27, Al, Ag)

366-N. (French.) **Magnetic Transformation of Cerium at High Temperatures. Role of Magnesium Impurity.** Francoise Gaume-Mahn. *Comptes rendus,* v. 241, no. 3, July 18, 1955, p. 286-288.

Dependence of magnetic properties on allotropic modification taking place at about 687° C. Influence of magnesium content on the temperature of allotropic modification and magnetic properties. Graphs. 10 ref. (N6, N11, P16, Ce)

367-N. (German.) **Diffusion in Solid Metals.** W. Seith. *Umschau in Wissenschaft und Technik,* v. 55, no. 16, Aug. 15, 1955, p. 491-493.

Mechanism of intermetallic diffusion, effect of temperature and lattice defects, formation of intermetallic phases, importance of diffusion in age hardening, homogenizing treatments and pressure welding. Graph, diagram, tables, micrographs. (N1, N7, J1, K5)

368-N. (Russian.) **Kinetics of the Isothermal Formation of Austenite.** A. P. Guliaev and V. M. Zalkin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1955, no. 6, June, p. 114-118.

Transformation of pearlite into austenite, effect of rate of heating on the kinetics of formation. Graphs. 8 ref. (N8, CN)

369-N. (Russian.) **Determination of Austenite Content According to Magnetic Saturation.** A. A. Popov and R. Sh. Shkliar. *Zavodskaia Laboratoriia,* v. 21, no. 6, June 1955, p. 677-685.

Magnetic methods of investigating decomposition of supercooled austenite, technique of operation, description of installation. Graphs, diagrams. 5 ref. (N8)

370-N. (Russian.) **Determination of Coefficients of Diffusion of the Elements in Ferrite, Using Radioactive Isotopes.** V. M. Golikov and V. T. Borisov. *Zavodskaia Laboratoriia,* v. 21, no. 7, July 1955, p. 824-827.

Equations based on the absorption of beta radiation by the specimen. Graph, diagram. (N1, ST)

371-N. (Russian.) **Use of Micro-Autoradiography for the Study of the Redistribution of Chromium During Diffusion Annealing.** I. E. Bolotov and M. I. Gol'dshtein. *Zavodskaia Laboratoriia,* v. 21, no. 7, July 1955, p. 828-830.

Effect of temperature and time of "soaking" during diffusion annealing for the redistribution of the chromium in steels and the degree of homogeneity afterwards. Micrographs, table. (N1, J23, ST, Cr)

P

Physical Properties and Test Methods

303-P. **Adsorption of Carbon Monoxide and Hydrogen on Cobalt: Presorption Experiments.** M. V. C. Sastri and T. S. Viswanathan. *American Chemical Society, Journal,* v. 77, Aug. 5, 1955, p. 3967-3971.

Effect of the prior adsorption of carbon monoxide on the subsequent adsorption of hydrogen and vice-versa studied on a cobalt Fischer-Tropsch catalyst at temperatures below that of detectable reaction on the catalyst surface. Graphs, tables. 19 ref. (P13, Co)

304-P. **The Resistance of the Oxide-Coated Cathode at Ultra-High Frequencies.** L. J. Herbst and J. E. Houldin. *British Journal of Applied Physics,* v. 6, July 1955, p. 236-238.

The impedance of the oxide-coated cathode of disk seal triodes measured at frequencies from 730 to 2360° mc. per sec. and with cathode temperatures from 1250 to 1400° K. Diagrams, tables. 3 ref. (P15)

305-P. **The Measurement of Iron Losses in Sheet Steels.** F. Brailsford. *Institution of Electrical Engineers, Journal,* v. 1, July 1955, p. 446-448.

Equipment and methods for measuring losses at high values of magnetic induction. Graphs, diagram. 1 ref. (P16, SG-p)

306-P. **Measurement of Temperature Coefficient of Resistance.** H. Philip Hovnanian. *Instruments and Automation,* v. 28, Aug. 1955, p. 1324-1326.

Analysis of effect of measuring errors on final result. Diagrams, table. 5 ref. (P15)

307-P. **The Specific Heats of Magnesium and Zinc.** P. L. Smith. *Philosophical Magazine,* v. 46, 7th ser., no. 378, July 1955, p. 744-750.

Experimental procedures and results of measurements between 1 and 20° K. on magnesium and 4 and 20° K. on zinc. Graphs. 12 ref. (P12, Mg, Zn)

308-P. **Digital Computer as a Laboratory Tool.** Arthur L. Loeb and Harry H. Denman. *Society for Industrial and Applied Mathematics, Journal,* v. 3, Mar. 1955, p. 1-16.

Electronic digital computation of optical constants of thin metal films. Diagram, table. 5 ref. (P17)

309-P. **Properties of Germanium and Silicon.** Esther M. Conwell. *Sylvania Technologist,* v. 8, July 1955, p. 86-90.

Review of recent germanium and silicon research. Information on the band structure and effective masses, account of such successes in the areas of infra-red absorption and magnetic field effects. Diagrams, graph. 32 ref. (P general, Ge, Si)

310-P. (English.) **Magnetic Properties of Cobalt Telluride.** Enji Uchida. *Physical Society of Japan, Journal,* v. 10, no. 7, July 1955, p. 517-522.

Results reported for Co Te_x, where x is the molal content, with measurements made in the temperature range between liquid air and 1150° C. Tables, graphs. 9 ref. (P16, Co, Te)

311-P. (English.) **On the Maze Domain of Silicon-Iron Crystal. I.** Soshin Chikazumi and Kenzo Suzuki. *Physical Society of Japan, Journal,* v. 10, no. 7, July 1955, p. 523-534.

Examination of the maze-like domain which appears on the mechanically polished surface of a silicon-iron crystal by powder pattern techniques. Micrographs, graphs, diagrams. 5 ref. (P16, Fe, Si)

312-P. (French.) **Reaction of Iron With Oxygen at Low Pressures and at Temperatures Between 650 and 850° C.** Earl A. Gulbransen, William R. McMillan and Kenneth F. Andrew. *Revue de metallurgie,* v. 52, no. 7, July 1955, p. 509-516; disc., p. 517.

Recent studies on annealed and highly electropolished specimens of Puron and Armco iron with the help of electronic optical methods. Discontinuous oxidation is observed and results interpreted in terms of substructure of the metal. Tables, micrographs, diffractograms. 17 ref. (P12, M27, Fe)

313-P. (German.) **Density and Viscosity of Liquid Aluminium and Aluminium Alloys.** E. Gebhardt, M. Becker and S. Dorner. *Aluminium,* v. 31, nos. 7-8, July-Aug. 1955, p. 315-321.

Measurements have been made of the density and viscosity of super-purity Al, and Al-Cu, -Mg, -Fe, -Ti, and -Zn alloys, to determine effect of these properties on castability. Tables, graphs, diagram. 28 ref. (P10, E general, Al)

314-P. (German.) **Investigation of the Electrical Conductivity of Aluminium.** P. Eversheim. *Aluminium,* v. 31, nos. 7-8, July-Aug. 1955, p. 338-341.

Effect of heat treatment and cold working on conductivity and tensile strength of hard-drawn pure aluminum wires, having iron-silicon ratios of 1:1, 1:2, and 1:3. Graphs. 4 ref. (P15, Q23, Al)

315-P. (German.) **The Electrical Conductivity of Super Purity Aluminium.** E. Nachtigall. *Aluminium,* v. 31, nos. 7-8, July-Aug. 1955, p. 341-342.

Shows that cold deformation affects the conductivity of aluminum much less than that of normal pure aluminum. Differences also occur between solution and precipitation-heat treated metals. Graphs. 4 ref. (P15, Al)

316-P. (German.) **The Initial Permeability of Several Ferrous Materials Under Mechanical Stress.** Werner Jellinghaus and Klaus Janssen. *Archiv für das Eisenhüttenwesen,* v. 26, no. 7, July 1955, p. 405-419.

Experimental study of four different steels subjected to tensile stresses within the elastic range; determination of the elastic limit by measuring the initial permeability; theory of the magnetization process; effect of demagnetization on the permeability of mechanically stressed material. Graphs, diagrams, tables, micrographs. 22 ref. (P16, Q23, Q21, ST)

317-P. (German.) **Magnetic Balance for Measuring Susceptibility.** Heinrich Beisswenger and Ernst Wachtel. *Zeitschrift für Metallkunde,* v. 46, no. 7, July 1955, p. 504-507.

Construction details of a balance, used in metallographic measurements, permits separation between para and ferromagnetic components of a specimen. Graphs, diagrams. 5 ref. (P16, M23, ST)

318-P. (German.) **Theory of the Magnetic Barrier Layer in Semiconductors.** O. Madelung, L. Tewordt and H. Welker. *Zeitschrift für Naturforschung,* v. 10a, no. 6, June 1955, p. 476-488.

Mathematical analysis of the theory and the possibility of expanding it. Graphs. 11 ref. (P15)

319-P. (German.) **Magnetic Barrier Layers in Germanium II.** E. Weisshaar. *Zeitschrift für Naturforschung,* v. 10a, no. 6, June 1955, p. 488-495.

Experimental verification of magnetic barrier layer theory. Method and procedure. Graphs, diagram. 7 ref. (P15, Ge)

320-P. (German.) **Gallium-Arsenic Photo-Element.** R. Gremmelmaier. *Zeitschrift für Naturforschung,* v. 10a, no. 6, June 1955, p. 501-502.

Attempt to transform solar energy to electricity by means of a gallium-arsenic photo-element. Graphs. 4 ref. (P15, As, Ga)

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Review of Italian research at the University of Milan. Photographs, diagrams. 120 ref. (P15, L17)

322-P. (Russian.) **Effect of Heat Treatment on the Concentration and Mobility of Charge Carriers in Germanium.** V. V. Ostroborodova and S. G. Kalashnikov. *Zhurnal Tekhnicheskoi Fiziki,* v. 25, no. 7, July 1955, p. 1163-1167.

Mobility of basic and nonbasic charge carriers decreases greatly near the zone of transformation. Effect of nonhomogeneities in the crystal. Graphs, tables. 21 ref. (P15, Ge)

323-P. (Russian.) **Recombination of Non-Equalized Charge Carriers on Thermal Acceptors in Germanium.** V. V. Ostroborodova and S. G. Kalashnikov. *Zhurnal Tekhnicheskoi Fiziki,* v. 25, no. 7, July 1955, p. 1168-1174.

Investigation of the influence of heat treatment on the rate of volumetric recombination of nonequalized electroms and holes in germanium. Diagrams, table, graphs. 10 ref. (P15, Ge)

324-P. (Russian.) **Thermoelectrical Properties of Alloys of the Antimony-Tellurium System.** F. I. Vasenin. *Zhurnal Tekhnicheskoi Fiziki,* v. 25, no. 7, July 1955, p. 1190-1197.

Preparation of alloys by melting in vacuum and by powder metallurgy to avoid liquation. Influence of additions and cooling rate on electrical properties. Tables, graphs. 2 ref. (P15, C25, H10, Sb, Te)

325-P. Ultrasonic Attenuation Measurements. Rohn Truell. *American Society of Mechanical Engineers, Paper No.* 55—S-17, 1955, 7 p.

Theory of ultrasonic-wave attenuation; measuring techniques. Applications for determining properties, flaws and structure. Graphs, photographs, micrographs, diagrams. (P10, S13, M23, S general)

326-P. Liquid Metals. II. The Surface Tension of Liquid Sodium: the Drop-Volume Technique. C. C. Addison, W. E. Addison, D. H. Kerridge and J. Lewis. *Chemical Society, Journal,* 1955, July, p. 2262-2264.

Measured from 110 to 200° C. in pure argon by above method. Graph, diagram. 5 ref. (P10, Na)

327-P. The Viscosity of Liquid Iron and Iron-Carbon Alloys. R. N. Barfield and J. A. Kitchener. *Iron and Steel Institute, Journal,* v. 180, Aug. 1955, p. 324-329.

Alloys with up to 4.4% carbon studied by oscillating crucible method. Carbon markedly reduces viscosity but increases activation energy for flow. Graphs, diagrams. 22 ref. (P10, P12, CI)

328-P. Solubility of Nitrogen in Alpha-Iron. J. D. Fast and M. B. Verrijp. *Iron and Steel Institute, Journal,* v. 180, Aug. 1955, p. 337-343.

Internal friction of fine-grained textureless alpha-iron wires caused by nitrogen shown to be proportional to nitrogen content. Solubilities of nitrogen in alpha-iron in equilibrium with Fe_8N, Fe_4N, and N_2 of one atmosphere, respectively, measured and expressed mathematically. Tables, graphs. 25 ref. (P13, P12, Fe)

329-P. The Effect of Alloying Elements on the Solubility of Nitrogen in Iron. I. The Solubility of Nitrogen in Pure Iron and in 2.83% Silicon Iron. N. S. Corney and E. T. Turkdogan. *Iron and Steel Institute, Journal,* v. 180, Aug. 1955, p. 344-348.

Nitrogen in alpha-iron determined at various temperatures and nitrogen potentials. Dissolved silicon (2.83%) reduces solubility of nitrogen in alpha-iron, for example, from 0.0033% to 0.0019% at 900° C. under one atmosphere of nitrogen. Graphs, diagram. 14 ref. (P13, P12, Fe, Si)

330-P. The Solubility of Sulphur in Iron and Iron-Manganese Alloys. E. T. Turkdogan, S. Ignatowicz, and J. Pearson. *Iron and Steel Institute, Journal,* v. 180, Aug. 1955, p. 349-354.

Solid solubility of sulfur in gamma-iron determined at 1000, 1200 and 1335° C. Manganese measurably reduces sulfur solubility. Graphs, diagram, phase diagram. 10 ref. (P13, P12, N12, Fe, Mn, S)

331-P. The Enthalpy and Specific Heat of Iron and Steel. J. R. Pattison. *Iron and Steel Institute, Journal,* v. 180, Aug. 1955, p. 359-368.

Tabulates true specific heats up to 1000° C. and heat contents up to 1400° C. Tables, graphs. 79 ref. (P12, CI, ST)

332-P. Preparation of Thin Magnetic Films and Their Properties. M. S. Blois, Jr. *Journal of Applied Physics,* v. 26, Aug. 1955, p. 975-980.

Preparation by vacuum evaporation of single thin layers and laminated structures of ferromagnetic alloys. Properties related to those parameters of the process which may be chosen to yield materials having desired characteristics. Graphs, diagram. 11 ref. (P16, L25, Fe, Ni, AY)

333-P. Domain Configurations and Crystallographic Orientation in Grain-Oriented Silicon Steel. W. S. Paxton and T. G. Nilan. *Journal of Applied Physics,* v. 26, Aug. 1955, p. 994-1000.

Orientation of individual grains of 3.25% silicon steel determined by the etch-pit optical-goniometer technique. Relationship found between the domain patterns and crystalline orientation. Diagrams, micrographs. 7 ref. (P16, M26, SG-p)

334-P. Radiation Induced Changes in the Electrical Resistivity of Alpha Brass. D. B. Rosenblatt, R. Smoluchowski and G. J. Dienes. *Journal of Applied Physics,* v. 26, Aug. 1955, p. 1044-1049.

Measures resistivity of brasses containing 10, 20 and 30% zinc at room temperature and 80 and 4° K. Alloys were irradiated in a nuclear reactor at +50° C. and 80° K. Tables, graphs. 20 ref. (P15, Cu, Zn)

335-P. Effect of Pressure on the Electrical Properties of Indium Antimonide. Donald Long. *Physical Review,* v. 99, ser. 2, July 15, 1955, p. 388-390.

Electrical resistivity and Hall coefficient of indium antimonide measured as a function of pressure to 2000 atmospheres at 0, 24.3 and 54.3° C. Graphs, tables. 4 ref. (P15, In, Sb)

336-P. Electrical Properties of *p*-Type Indium Antimonide at Low Temperatures. H. Fritzsche and K. Lark-Horovitz. *Physical Review,* v. 99, ser. 2, July 15, 1955, p. 400-405.

Electrical resistivity, Hall coefficient and transverse magnetoresistive ratio of single crystals measured between 370 and 1.5° K. Graphs, table. 19 ref. (P15, In, Sb)

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Low-temperature anomalies in the Hall coefficient and electrical resistivity investigated at temperatures between 1.5 and 300° K. using single crystals of *n*- and *p*-type germanium of various impurity concentrations. Tables, graphs. 19 ref. (P15, Ge)

338-P. Cohesive Energy of Noble Metals. K. Kambe. *Physical Review,* v. 99, ser. 2, July 15, 1955, p. 419-422.

Calculations include the effects of the deviation of the effective ion-core potential from pure hydrogenic form in the vicinity of the surface of the *s*-sphere. Formula derived for calculating logarithmic derivative of the wave function at the surface of the *s*-sphere. Tables. 13 ref. (P12, EG-c)

339-P. Specific Heat of Bismuth at Liquid Helium Temperatures. K. G. Ramanathan and T. M. Srinivasan. *Physical Review,* v. 99, ser. 2, July 15, 1955, p. 442-443.

Investigations at temperatures down to 1.3° K. by means of a new vacuum calorimeter. Graph. 7 ref. (P12, Bi)

340-P. Optical Properties of Plastically Deformed Germanium. H. G. Lipson, E. Burstein and Paul L. Smith. *Physical Review,* v. 99, ser. 2, July 15, 1955, p. 444-445.

N-type germanium specimens of one ohm-cm. resistivity were plastically deformed from 3 to 15% at about 700° C. The more strongly deformed specimens were found to be converted to *p*-type. All of the deformed specimens exhibited a shift in the intrinsic absorption. Graphs. 7 ref. (P17, Q24, Ge)

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Absorption and photoconduction studied at low temperatures. Graphs. 4 ref. (P17, Si)

343-P. Magnetic Susceptibility of Indium Antimonide. D. K. Stevens and J. H. Crawford, Jr. *Physical Review,* v. 99, ser. 2, July 15, 1955, p. 487-488.

Measurements of both *n*- and *p*-types at tempeautrers from 65 to 650° K. Graphs. 4 ref. (P16, In, Sb)

344-P. Effect of Pressure on the Electrical Conductivity of InSb. Robert W. Keyes. *Physical Review,* v. 99, ser. 2, July 15, 1955, p. 490-495.

Measurements as a function of temperature from −78 to +300° C. and pressures up to 12,000 kg. per sq. cm. Graphs, diagram. 17 ref. (P15, In, Sb)

345-P. The Design of Engineering Magnetic Materials. K. Hoselitz. *Times Science Review,* 1955, Autumn, p. 8-9.

Principles that form the basis of the technology of magnetic materials engineering and some of results achieved. Diagrams, photographs, table. (P16, SG-n, p)

346-P. On the Dephosphorization of Steel Baths. H. O. von Samson-Himmelstjerna. *Henry Brutcher Translation No.* 134, 18 p. (From *Archiv für das Eisenhüttenwesen,* v. 6, no. 11, 1932-33, p. 471-475.) Henry Brutcher, Altadena, Calif.

Thermochemical data on heats of formation of Fe_2P and phosphates of various oxides, checked on the basis of heating curves of solid mixtures of Fe_2P with oxides; prediction of direction of reaction in liquid state. Graphs, micrographs. 12 ref. (P12, ST)

347-P. (Czech.) **Properties and Use of Sintered Permanent Magnets.** Zdenek Ministr. *Hutnické Listy,* v. 10, no. 7, July 1955, p. 389-396.

Properties of sintered and cast permanent magnets AlNi and advantages and disadvantages of both production methods compared. Dia-

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348-P. (German.) **Effect of Temperature on the Resistance Behavior of Vapor-Deposited Bismuth Bolometers.** H. Reimann. *Annalen der Physik,* v. 16, nos. 1-2, 1955, p. 52-58.

Measurement of temperature coefficient of bismuth coating as function of film thickness. Attempt to prevent aging effects by heat treatment. Graphs, tables. 6 ref. (P15, L25, J general, Bi)

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Course of induction in permanent magnet materials at a cyclic change of field intensity of the negative outside field. Description of N. Neumann's test apparatus. Tables, diagrams, graphs. 7 ref. (P16, SG-n)

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Physics of galvanomagnetic effects and effect of shape of indium stibnide and indium arsenide on resistance variation and Hall effect as functions of magnetic induction. Diagrams, graphs, tables. 10 ref. (P15, P16, In, Sb, As)

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Hall effect and resistance change in the transverse magnetic field in impurity semiconductors, intrinsic semiconductors and metals; magnetic blocking-layer and other galvanomagnetic effects. Diagrams, graphs. 14 ref. (P15, P16)

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Effect of composition and temperature on magnetic susceptibility; normal ferromagnetism in the stoichiometric compound, Au_4Mn. Graph. 2 ref. (P16, Cu, Mn, Au)

353-P. (German.) **Superconduction and Resistance of Thin Indium Layers With Lattice Dislocations and Additions of Foreign Metal.** Wolfgang Opitz. *Zeitschrift für Physik,* v. 141, no. 3, 1955, p. 263-276.

Effect of temperature of deposition and thickness on resistance and superconducting properties of vapor-deposited indium films; increased freezing-in of lattice dislocations and increase in critical temperature of superconduction with decreasing temperature of deposition; effect of copper, lead, zinc, chromium, manganese and iron additions on lattice distortions. Graphs. 10 ref. (P15, In)

354-P. (German.) **Effect of Diffusion Length and Surface Recombination on the Blocking-Layer Photoeffect in Germanium.** H. U. Harten and W. Schultz. *Zeitschrift für Physik,* v. 141, no. 3, 1955, p. 319-334.

Preparation of photocells of relatively large surfaces by vapor-depositing a translucent film of gold on germanium; determination of diffusion length of minority charge carriers in "thick" cells and recombination rate of charge carriers on free surface of germanium plate in "thin" cells from the spectrum pattern of sensitivity. Diagrams, graphs, tables. 22 ref. (P15, N1, Au, Ge)

355-P. (Russian.) **Heat Content and Thermal Capacity of Iron and Cast Iron.** I. P. Egorenkov. *Liteinoe Proizvodstvo,* 1955, no. 7, July, p. 20-24.

Comparative analysis of the heat content and thermal capacity of pure iron and cast iron components. Heat of melting (solidification) of steel and cast iron. Tables, graphs. 8 ref. (P12, N12, Fe, CI)

356-P. **The Surface Energies of the Alkali Metals.** J. W. Taylor. *Philosophical Magazine,* v. 46, 7th ser., no. 379, Aug. 1955, p. 867-876.

Energies and temperature coefficients determined experimentally. Values for lithium and sodium agree with earlier work. Tables, graphs, diagram. 15 ref. (P12, K, Li, Na)

357-P. **The Structure and Magnetic Properties of the Alloy Mn_3AlC.** R. G. Butters and H. P. Myers. *Philosophical Magazine,* v. 46, 7th ser., no. 379, Aug. 1955, p. 895-902.

The single phase as-cast alloy, similar to the alloy Mn_3ZnC, was feebly magnetic but retained this state after homogenization at 1000° C. Alloy is strongly magnetic at low temperatures. Tables, graphs. 4 ref. (P16, Al, Mn)

358-P. **Electron Transport in Copper and Dilute Alloys at Low Temperature. III. Solid Solutions of Iron in Copper. IV. Resistance Minimum: Temperature of Occurrence as a Function of Solute Concentration.** W. B. Pearson. *Philosophical Magazine,* v. 46, 7th ser., no. 379, Aug. 1955, p. 911-923.

Measurements made between 4.2 and 50° K. show that iron gives rise to particularly large anomalous thermoelectric effects and minima in the resistance when dissolved in copper. Presents temperature where the resistance minimum occurs for a large number of dilute copper alloys containing iron, gallium, indium, silicon, germanium, tin, lead and bismuth as solutes. Graphs. 19 ref. (P15, N12, Bi, Cu, Fe, Ga, Ge, In, Pb, Si, Sn)

359-P. **A Study of Domain Structures in Alnico.** L. F. Bates and D. H. Martin. *Physical Society Proceedings,* v. 68, no. 428B, Aug. 1955, p. 537-540.

Record of a powder deposit examination of the ferromagnetic domain structures in four specimens of Alnico in which were developed coercivities of about 2 (quenched), 10, 40 and 100 oersteds respectively. 4 ref. (P16, SG-n)

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Data on arc erosion rates for the following elements listed in order of excellence: carbon, tungsten, molybdenum, nickel, iron, titanium, copper, silver, zinc, aluminum and tin. Graphs, diagrams, tables, photograph. 16 ref. (P15, SG-r)

361-P. **Metal Foils as Filters in the Soft X-Ray Region.** D. H. Tomboulian and D. E. Bedo. *Review of Scientific Instruments,* v. 26, Aug. 1955, p. 747-750.

Use of thin foils of beryllium, magnesium and aluminum as filters in the 50 to 400 A spectral region. Graph, X-ray spectra. 6 ref. (P17, T8, Al, Be, Mg)

362-P. **The Magnetic Threshold Curve of Superconductors.** B. Serin. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 138-150.

Thermodynamic theory, specific heat of superconductive tin, effects of impurities. Graphs, table. 36 ref. (P12, P16, Sn)

363-P. **The Effect of Pressure and of Stress on Superconductivity.** C. F. Squire. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 151-158.

Theory and review of present knowledge. Studies with bismuth and bismuth alloys. Graphs, diagrams, table. 29 ref. (P15, Bi)

364-P. **Heat Conduction in Superconductors.** K. Mendelssohn. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 184-201.

Theory, results at temperatures below 1° K. Graphs, diagram. 31 ref. (P11, P15)

365-P. **The Electronic Specific Heats in Metals.** J. G. Daunt. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 202-223.

Evaluation from low-temperature calorimetric measurements and magnetic observations; superconductors; influence of inter-electronic interaction. Graphs, tables. 108 ref. (P12)

366-P. **Antiferromagnetic Crystals.** N. J. Poulis and C. J. Gorter. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers Inc., p. 245-271.

Low-temperature mol. field theory of anisotropic crystals; magnetization as a function of the field; antiferromagnetic resonance. Graphs. 50 ref. (P16)

367-P. **Adiabatic Demagnetization.** D. de Klerk and M. J. Steenland. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 272-335.

Low - temperature experimental methods, magnetic behavior, nuclear orientation and demagnetization. Diagrams, graphs, table, circuit diagrams. 138 ref. (P16)

368-P. **Theoretical Remarks on Ferromagnetism at Low Temperatures.** L. Néel. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 336-343.

Effects of finely dispersed substances, substances with Bloch walls, thermal activation. 9 ref. (P16)

369-P. **Experimental Research on Ferromagnetism at Very Low Temperatures.** L. Weil. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 344-354.

Methods of measurement, results obtained with fine powders, films and alloys, magnetic relaxation. Graphs, diagrams, table. 22 ref. (P16)

370-P. (English.) **The Heats of Formation in the Systems Titanium-Aluminium and Titanium-Iron.** O. Kubaschewski and W. A. Dench. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 339-346.

Calorimeter constructed for determining exothermic heats of alloying. Possibility of producing titanium-aluminum from TiO_2 and excess aluminum. Diagram, tables, graphs, micrographs. 8 ref. (P12, M24, Al, Fe, Ti)

371-P. (English.) **Electron Transport in Copper and Dilute Alloys at Low Temperatures. I-II.** D. K. C. MacDonald and W. B. Pearson. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 392-408.

Experimental studies of a wide range of alloys, problems involved

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344-P. Effect of Pressure on the Electrical Conductivity of InSb. Robert W. Keyes. *Physical Review,* v. 99, ser. 2, July 15, 1955, p. 490-495.

Measurements as a function of temperature from −78 to +300° C. and pressures up to 12,000 kg. per sq. cm. Graphs, diagram. 17 ref. (P15, In, Sb)

345-P. The Design of Engineering Magnetic Materials. K. Hoselitz. *Times Science Review,* 1955, Autumn, p. 8-9.

Principles that form the basis of the technology of magnetic materials engineering and some of results achieved. Diagrams, photographs, table. (P16, SG-n, p)

346-P. On the Dephosphorization of Steel Baths. H. O. von Samson-Himmelstjerna. *Henry Brutcher Translation No.* 134, 18 p. (From *Archiv für das Eisenhüttenwesen,* v. 6, no. 11, 1932-33, p. 471-475.) Henry Brutcher, Altadena, Calif.

Thermochemical data on heats of formation of Fe_2P and phosphates of various oxides, checked on the basis of heating curves of solid mixtures of Fe_2P with oxides; prediction of direction of reaction in liquid state. Graphs, micrographs. 12 ref. (P12, ST)

347-P. (Czech.) **Properties and Use of Sintered Permanent Magnets.** Zdenek Ministr. *Hutnické Listy,* v. 10, no. 7, July 1955, p. 389-396.

Properties of sintered and cast permanent magnets AlNi and advantages and disadvantages of both production methods compared. Dia-

grams, graphs, tables, micrographs. 8 ref. (P16, SG-n)

348-P. (German.) **Effect of Temperature on the Resistance Behavior of Vapor-Deposited Bismuth Bolometers.** H. Reimann. *Annalen der Physik,* v. 16, nos. 1-2, 1955, p. 52-58.
Measurement of temperature coefficient of bismuth coating as function of film thickness. Attempt to prevent aging effects by heat treatment. Graphs, tables. 6 ref.
(P15, L25, J general, Bi)

349-P. (German.) **Stabilizing Processes in Permanent Magnets.** Ilse Titz, Franz Raidl, and Helmut Krainer. *Archiv für das Eisenhüttenwesen,* v. 26 no. 8, Aug. 1955, p. 491-496.
Course of induction in permanent magnet materials at a cyclic change of field intensity of the negative outside field. Description of N. Neumann's test apparatus. Tables, diagrams, graphs. 7 ref.
(P16, SG-n)

350-P. (German.) **New Materials of Large Hall Effect and Large Resistance Change in the Magnetic Field.** Heinrich Welker. *Elektrotechnische Zeitschrift,* v. 76, Ausgabe A, no. 15, Aug. 1955, p. 513-517.
Physics of galvanomagnetic effects and effect of shape of indium stibnide and indium arsenide on resistance variation and Hall effect as functions of magnetic induction. Diagrams, graphs, tables. 10 ref.
(P15, P16, In, Sb, As)

351-P. (German.) **Galvanomagnetic Effects in Semiconductors.** Otfried Madelung. *Naturwissenschaften,* v. 42, no. 14, July 1955, p. 406-410.
Hall effect and resistance change in the transverse magnetic field in impurity semiconductors, intrinsic semiconductors and metals; magnetic blocking-layer and other galvanomagnetic effects. Diagrams, graphs. 14 ref.
(P15, P16)

352-P. (German.) **Antiferromagnetism in Manganese-Copper and Manganese-Gold Alloys.** Albrecht Kussmann and Ernst Raub. *Naturwissenschaften,* v. 42, no. 14, July 1955, p. 411.
Effect of composition and temperature on magnetic susceptibility; normal ferromagnetism in the stoichiometric compound, Au_4Mn. Graph. 2 ref.
(P16, Cu, Mn, Au)

353-P. (German.) **Superconduction and Resistance of Thin Indium Layers With Lattice Dislocations and Additions of Foreign Metal.** Wolfgang Opitz. *Zeitschrift für Physik,* v. 141, no. 3, 1955, p. 263-276.
Effect of temperature of deposition and thickness on resistance and superconducting properties of vapor-deposited indium films; increased freezing-in of lattice dislocations and increase in critical temperature of superconduction with decreasing temperature of deposition; effect of copper, lead, zinc, chromium, manganese and iron additions on lattice distortions. Graphs. 10 ref. (P15, In)

354-P. (German.) **Effect of Diffusion Length and Surface Recombination on the Blocking-Layer Photoeffect in Germanium.** H. U. Harten and W. Schultz. *Zeitschrift für Physik,* v. 141, no. 3, 1955, p. 319-334.
Preparation of photocells of relatively large surfaces by vapor-depositing a translucent film of gold on germanium; determination of diffusion length of minority charge carriers in "thick" cells and recombination rate of charge carriers on free surface of germanium plate in "thin" cells from the spectrum pattern of sensitivity. Diagrams, graphs, tables. 22 ref.
(P15, N1, Au, Ge)

355-P. (Russian.) **Heat Content and Thermal Capacity of Iron and Cast Iron.** I. P. Egorenkov. *Liteinoe Proizvodstvo,* 1955, no. 7, July, p. 20-24.
Comparative analysis of the heat content and thermal capacity of pure iron and cast iron components. Heat of melting (solidification) of steel and cast iron. Tables, graphs. 8 ref. (P12, N12, Fe, CI)

356-P. **The Surface Energies of the Alkali Metals.** J. W. Taylor. *Philosophical Magazine,* v. 46, 7th ser., no. 379, Aug. 1955, p. 867-876.
Energies and temperature coefficients determined experimentally. Values for lithium and sodium agree with earlier work. Tables, graphs, diagram. 15 ref.
(P12, K, Li, Na)

357-P. **The Structure and Magnetic Properties of the Alloy Mn_3AlC.** R. G. Butters and H. P. Myers. *Philosophical Magazine,* v. 46, 7th ser., no. 379, Aug. 1955, p. 895-902.
The single phase as-cast alloy, similar to the alloy Mn_3ZnC, was feebly magnetic but retained this state after homogenization at 1000° C. Alloy is strongly magnetic at low temperatures. Tables, graphs. 4 ref. (P16, Al, Mn)

358-P. **Electron Transport in Copper and Dilute Alloys at Low Temperature. III. Solid Solutions of Iron in Copper. IV. Resistance Minimum: Temperature of Occurrence as a Function of Solute Concentration.** W. B. Pearson. *Philosophical Magazine,* v. 46, 7th ser., no. 379, Aug. 1955, p. 911-923.
Measurements made between 4.2 and 50° K. show that iron gives rise to particularly large anomalous thermoelectric effects and minima in the resistance when dissolved in copper. Presents temperature where the resistance minimum occurs for a large number of dilute copper alloys containing iron, gallium, indium, silicon, germanium, tin, lead and bismuth as solutes. Graphs. 19 ref.
(P15, N12, Bi, Cu, Fe, Ga, Ge, In, Pb, Si, Sn)

359-P. **A Study of Domain Structures in Alnico.** L. F. Bates and D. H. Martin. *Physical Society Proceedings,* v. 68, no. 428B, Aug. 1955, p. 537-540.
Record of a powder deposit examination of the ferromagnetic domain structures in four specimens of Alnico in which were developed coercivities of about 2 (quenched), 10, 40 and 100 oersteds respectively. 4 ref. (P16, SG-n)

360-P. **High-Current Arc Erosion of Electric Contact Materials.** W. R. Wilson. *Power Apparatus and Systems,* 1955, no. 19, Aug., p. 657-664; disc., p. 664.
Data on arc erosion rates for the following elements listed in order of excellence: carbon, tungsten, molybdenum, nickel, iron, titanium, copper, silver, zinc, aluminum and tin. Graphs, diagrams, tables, photograph. 16 ref. (P15, SG-r)

361-P. **Metal Foils as Filters in the Soft X-Ray Region.** D. H. Tomboulian and D. E. Bedo. *Review of Scientific Instruments,* v. 26, Aug. 1955, p. 747-750.
Use of thin foils of beryllium, magnesium and aluminum as filters in the 50 to 400 A spectral region. Graph, X-ray spectra. 6 ref.
(P17, T8, Al, Be, Mg)

362-P. **The Magnetic Threshold Curve of Superconductors.** B. Serin. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 138-150.
Thermodynamic theory, specific heat of superconductive tin, effects of impurities. Graphs, table. 36 ref.
(P12, P16, Sn)

363-P. **The Effect of Pressure and of Stress on Superconductivity.** C. F. Squire. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 151-158.
Theory and review of present knowledge. Studies with bismuth and bismuth alloys. Graphs, diagrams, table. 29 ref. (P15, Bi)

364-P. **Heat Conduction in Superconductors.** K. Mendelssohn. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 184-201.
Theory, results at temperatures below 1° K. Graphs, diagram. 31 ref. (P11, P15)

365-P. **The Electronic Specific Heats in Metals.** J. G. Daunt. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 202-223.
Evaluation from low-temperature calorimetric measurements and magnetic observations; superconductors; influence of inter-electronic interaction. Graphs, tables. 108 ref.
(P12)

366-P. **Antiferromagnetic Crystals.** N. J. Poulis and C. J. Gorter. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers Inc., p. 245-271.
Low-temperature mol. field theory of anisotropic crystals; magnetization as a function of the field; antiferromagnetic resonance. Graphs. 50 ref. (P16)

367-P. **Adiabatic Demagnetization.** D. de Klerk and M. J. Steenland. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 272-335.
Low - temperature experimental methods, magnetic behavior, nuclear orientation and demagnetization. Diagrams, graphs, table, circuit diagrams. 138 ref. (P16)

368-P. **Theoretical Remarks on Ferromagnetism at Low Temperatures.** L. Néel. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 336-343.
Effects of finely dispersed substances, substances with Bloch walls, thermal activation. 9 ref.
(P16)

369-P. **Experimental Research on Ferromagnetism at Very Low Temperatures.** L. Weil. Paper from "Progress in Low Temperature Physics". v. I. Interscience Publishers, Inc., p. 344-354.
Methods of measurement, results obtained with fine powders, films and alloys, magnetic relaxation. Graphs, diagrams, table. 22 ref.
(P16)

370-P. (English.) **The Heats of Formation in the Systems Titanium-Aluminium and Titanium-Iron.** O. Kubaschewski and W. A. Dench. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 339-346.
Calorimeter constructed for determining exothermic heats of alloying. Possibility of producing titanium-aluminum from TiO_2 and excess aluminum. Diagram, tables, graphs, micrographs. 8 ref.
(P12, M24, Al, Fe, Ti)

371-P. (English.) **Electron Transport in Copper and Dilute Alloys at Low Temperatures. I-II.** D. K. C. MacDonald and W. B. Pearson. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 392-408.
Experimental studies of a wide range of alloys, problems involved

in preparing such very dilute alloys, interpreting the findings. Graphs, tables. 40 ref. (P15, Cu)

372-P. (German.) **The Measuring of Heat Conductivity According to Diesselhorst.** O. Rüdiger and H. D. Dietze. *Technische Mitteilungen Krupp,* v. 13, no. 3, July 1955, p. 56-61.

Theoretical bases of the Kohlrausch and Diesselhorst method. The technique of measuring the heat conductivity of metallic conductors. Diagrams, photograph, graph. 4 ref. (P11)

373-P. (German.) **Magnetic Resistance Change of Germanium Monocrystals Between 10 and 300° K.** G. Lautz and W. Ruppel. *Zeitschrift für Naturforschung,* v. 10a, no. 7, July 1955, p. 521-526.

Experiments show that the absolute resistance change measured on *p*- and *n*-conducting germanium crystals are considerably higher than the theoretical resistance change. Graphs. 10 ref. (P16, Ge)

374-P. (German.) **Electrical and Optical Properties of Silver Telluride, Ag_2Te.** Joachim Appel. *Zeitschrift für Naturforschung,* v. 10a, no. 7, July 1955, p. 530-541.

Phase transformation and change in electrical properties at 150° C.; studies of temperature effect on electrical conductivity and galvanomagnetic effects on stoichiometric *n*-conducting specimens of low-temperature or beta phase indicate a covalent metallic bond and also that germanium, tin and antimony atoms have a great effect on charge-carrier concentration and mobility. Graphs, table. 13 ref. (P15, P17, N6, Ag, Te)

375-P. (Russian.) **Electrical and Thermal Conductivity of Certain Copper-Nickel Sulfide Alloys.** D. M. Chizhikov, Z. F. Gulianitskaia and N. N. Bogovarova. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1955, no. 6, June, p. 109-113.

Compositions of alloys of copper, nickel and iron sulfides. Relation between amount of iron and the specific electroconductivity and thermal conductivity of the copper-nickel mattes. Tables, graphs. 1 ref. (P15, P11, Cu, Ni, Fe)

376-P. (Russian.) **Differential Magnetic Method for Investigating Steel and Alloys.** V. G. Permiakov, Iu. V. Naidich and S. A. Rybak. *Zavodskaia Laboratoriia,* v. 21, no. 6, June 1955, p. 695-699.

Theoretical bases of proposed method for determining degree of magnetization; sample determination of residual austenite. Graphs, diagrams. 5 ref. (P16, M23, ST)

377-P. (Russian.) **Influence of Inter-electron Collisions on Electrical Conductivity and Skin-Effect in Metals.** V. L. Ginzburg and V. P. Silin. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 29, no. 1, July 1955, p. 64-74.

Mathematical treatment. Tables. 20 ref. (P15)

378-P. (Book.) **Progress in Low Temperature Physics.** C. J. Gorter, editor. Series in Physics. v. I. 418 p. 1955. North Holland Publishing Co., Amsterdam. $8.75; Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y.

Recent research and present status of knowledge in magnetism, liquid helium, and superconductivity. (P general)

Q

Mechanical Properties and Test Methods; Deformation

859-Q. **Strength of Small Metal Specimens.** Conyers Herring. *Bell Laboratories Record,* v. 33, Aug. 1955, p. 285-289.

Properties of "ideal crystals" and crystals without any imperfections of structure, in the study of dislocation. Photographs, graph, diagrams. (Q23, M26)

860-Q. **Young's Modulus of Alloys. III. Cast Alloys of Cu-Zn Systems.** Ichiro Iitaka and Toshimasa Morooka. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 69-70.

Variations of Young's modulus on annealing of cast brasses; relation between Young's modulus and the percentage of zinc. Graphs, table. (Q21, Cu)

861-Q. **The Flexural Fatigue Strength of Coin Dimpled 75S-T Aluminium Alloy Sheet.** S. W. Gee and J. Y. Mann. *Commonwealth of Australia, Dept. of Supply, Research and Development Branch,* A.R.L./S.M. 215, Dec. 1954, 7 p. + 9 plates.

Hot dimpling produced the best fatigue properties; fatigue strength reduction factor of cold dimpled specimens was comparable to that of drilled holes suitable for the same diameter rivet; at low stresses, the fatigue strengths approached those of the unnotched material. Tables, diagrams, micrographs, graphs. 3 ref. (Q7, G2, Al)

862-Q. **A Typical Problem in Engineering: Determine the Interference Fit and Resulting Stresses in the Design of a Cold Extrusion Die.** Charles R. Bradlee. *General Motors Engineering Journal,* v. 2, July-Aug. 1955, p. 38-39.

Determination of an interference fit to produce piston pins from low-carbon steel. Diagrams. 4 ref. (Q25, CN)

863-Q. **The Elastic Plastic Theory of Containers and Liners for Extrusion Presses.** M. R. Horne. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 4, 1955, p. 107-117; disc., p. 118-122.

Design of containers and liners for steel extrusion based on elastic-plastic behavior, anomalies considered. Tables, graphs, diagrams. 13 ref. (Q21, Q23)

864-Q. **Plastic Flow in a Converging Conical Channel.** R. T. Shield. *Journal of the Mechanics and Physics of Solids,* v. 3, July 1955, p. 246-258.

Mathematical analysis of the flow of a plastic-rigid material forced through a rigid conical-shaped channel or die. Diagrams, graphs. 11 ref. (Q24)

865-Q. **On the Contribution of Crystallographic Fibring to Hardening Under Uniaxial Straining Conditions.** J. F. W. Bishop. *Journal of the Mechanics and Physics of Solids,* v. 3, July 1955, p. 259-266.

In the development of a deformation texture, in certain face-centered cubic metals, on the tensile and compressive strength, isotropic materials harden approximately equally in tension and compression for logarithmic strains up to 0.3. Graphs. 15 ref. (Q27, Q28, Q29)

866-Q. **Average Warping in the Torsion of Thin-Walled Open-Section Beams.** A. H. Chilver. *Journal of the Mechanics and Physics of Solids,* v. 3, July 1955, p. 267-274.

It is suggested that in the theory of nonuniform torsion of thin-walled beams it is strictly relevant to define average longitudinal warping as the mean value taken over the whole cross-sectional area. Diagrams, graphs. 2 ref. (Q1)

867-Q. **The Effect of Prestraining in Simple Tension and Biaxial Tension on Flow and Fracture Behaviour of a Low Carbon Deep-Drawing Steel Sheet.** F. Garofalo and J. R. Low, Jr. *Journal of the Mechanics and Physics of Solids,* v. 3, July 1955, p. 275-294.

The effect produced in the rolling direction of a fully killed steel sheet was determined in subsequent tension at 0, 22.5, 45, 67.5 and 90° to the rolling direction; under bi-axial tension, the effect was determined at 0 and 45°. Diagram, graphs, table. 30 ref. (Q27, Q24, Q26, CN)

868-Q. **Neutrons, Gamma Rays, & Wear.** A. Hundere, G. C. Lawrason and J. P. O'Meara. *Lubrication Engineering,* v. 11, July-Aug. 1955, p. 230-237.

Brief summary of experiences and results obtained in utilizing the radio-active tracer technique for studying wear. Photographs, diagrams, graphs, table. 5 ref. (Q9, S19)

869-Q. **Atoms Trace the Wear.** W. R. Miller and H. R. Jackson. *Lubrication Engineering,* v. 11, July-Aug. 1955, p. 238-241.

Radio-active piston ring technique, a new tool for measuring engine wear. Tables, graphs. (Q9, S19)

870-Q. **Evaluating Bearing Materials Under Boundary Lubrication.** B. Lunn. *Lubrication Engineering,* v. 11, July-Aug. 1955, p. 255-259; disc., p. 259-260.

Test to determine the ability of a metal to develop a nonscoring boundary film. Diagrams, graphs, phototgraphs, tables. 10 ref. (Q9, SG-c)

871-Q. **The Influence of Moisture on the Friction & Surface Damage of Clean Metals.** R. O. Daniels and A. C. West. *Lubrication Engineering,* v. 11, July-Aug. 1955, p. 261-266.

Controlled atmosphere, low-speed friction apparatus for fundamental boundry lubrication studies. Photographs, micrograph, graphs, diagrams. 13 ref. (Q9)

872-Q. **Flexural Strength.** L. H. Symes. *Machine Design,* v. 27, Aug. 1955, p. 163-168.

Practical approach to the determination of bending strengths for different materials and section shapes and the organization of analytical data for design analysis. Table, diagrams, graphs. 4 ref. (Q5)

873-Q. **Metal Transfer and the Wear Process.** M. Kerridge. *Physical Society, Proceedings,* v. 68, no. 427B, July 1955, p. 400-407.

A radio-active, annealed steel pin rubbing against a hardened steel ring is used to compare the amount of wear with the amount of metal transferred from one surface to the other by welding. Using a combination of radio-active and inactive test pieces, the rate of transfer to the ring in the equilibrium condition was estimated and found to be the same as the wear rate of the pin. Graphs. 13 ref. (Q9, ST)

874-Q. **Softer Blades Stand Stress Better in the J47.** E. M. Phillips and R. E. Weymouth. *SAE Journal,* v. 63, Aug. 1955, p. 60-62.

Investigation of softer blades showed preferable qualities of resistance to stress corrosion, impact strength, heat treatment, and machinability. Graphs.
(Q7, R1, J general, G17)

875-Q. Axial-Load Fatigue Properties of 24S-T and 75S-T Aluminum Alloy as Determined in Several Laboratories. H. J. Grover, W. S. Hyler, Paul Kuhn, Charles B. Landers and F. M. Howell. *U. S. National Advisory Committee for Aeronautics, Report* 1190, 1954, 25 p.

Results obtained in the determination of the fatigue properties of 24S-T3 and 75S-T6 aluminum alloys widely used in airframe construction. Photographs, diagrams, graphs, tables, micrographs. 12 ref.
(Q7, Al)

876-Q. Calibration of Strain-Gage Installations in Aircraft Structures for the Measurement of Flight Loads. T. H. Skopinski, William S. Aikens, Jr., and Wilber B. Huston. *U. S. National Advisory Committee for Aeronautics, Report* 1178, 1954, 29 p.

A basic calibration procedure is developed for calibrating strain-gage installations on aircraft structures which permits the measurement in flight of the shear, bending moment and torque. Diagrams, graphs, tables. 12 ref. (Q25)

877-Q. (English.) **Effect of Welding When Superposed Upon Prestrained Steel.** Yoshio Ando, Isao Yamaguchi, Kunihiro Iida and Yasuho Imai. *Institute of Industrial Science, Report, (University of Tokyo),* v. 4, no. 7, Mar. 1955, p. 283-313.

Results of various tensile, bending, fatigue, corrosion and notch brittleness tests in the investigation of this problem. Photographs, graphs, micrographs, diagrams, tables. (Q general, K9, R11, ST)

878-Q. (French.) **Disorganization and Cold Restoration of Aluminum Crystals Subjected to Weak Tensions.** Jules Caisso and Raymond Jacquesson. *Comptes rendus,* v. 241, no. 1, July 4, 1955, p. 50-52.

Changes brought about by tension in the texture of an aluminum monocrystal. 3 ref. (Q24, Al)

879-Q. (French.) **Investigation of the Main Defects Liable to Occur During Condenser Copper-Nickel Tube Manufacture.** Jean R. Maréchal. *Revue de métallurgie,* v. 52, no. 7, July 1955, p. 537-552.

Considers causes of lamination to be from defective heat and ingot pouring, while cracks form in the piercing operation. Tables, graphs, photographs, micrographs.
(Q26, S21, Cu, Ni)

880-Q. (French.) **Comparative Physical Properties of Low and High Nickel Bearing Steels.** R. Cazaud. *Revue de métallurgie,* v. 52, no. 7, July 1955, p. 579-582; disc., p. 583-585.

For identical tensile strengths, low nickel-bearing steels are capable of endurance strengths at least equal, if not superior, to those offered by steels with heavier nickel contents. Resistance to fatigue tests with notched specimens are in the same range. Tables, graphs.
(Q7, Q23, AY)

881-Q. (French.) **Mechanism of Brittle Fractures.** T. S. Robertson. *Revue de la soudure (Brussels),* v. 11, no. 2, 1955, p. 85-90.

Experimental investigation of the influence of grain size on the brittle fracture of carbon-0.16, manganese-0.60 and carbon-0.16, manganese-1.7 steels. Tables, graphs.
(Q26, Q23, ST)

882-Q. (German.) **Sliding Wear, Rinsing Wear, and Blasting Wear Under the Influence of Granular Solids.** Karl Wellinger and Herbert Uetz. *Forschung auf dem Gebiete des Ingeniuerwesens,* v. 21, Ausgabe B, *VDI-Forschungsheft* 449, 1955, 40 p.

Results of tests on a large quantity of flat and tubular test specimens, from various materials such as steel in various grades, chill casting, cast basalt and rubberlike substances, tested for wear resistance against limestone, glass, coke dust, flint, river sand, quartz, garnet, corundum, silicon carbide and casting shots of various hardness values. Tables, diagrams, photographs, graphs. 40 ref.
(Q9, Q29, ST)

883-Q. (German.) **Stress Tolerances of Pressure-Cast Zinc Parts.** G. Lieby. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 658-661.

Corrosive effects of the atmosphere, acids, alkalies, foods, benzene; methods of applying protective films; effect of temperature on strength properties; mechanical properties and wear resistance of zinc and zinc alloys. Photograph, graphs, diagrams. 4 ref.
(Q general, R1, Zn)

884-Q. (German.) **The Problem of Standardizing Spherical Cast Iron and the Relations Between the Mechanical Properties and the Structures of Ductile Cast Iron.** C. Pensotti and E. Mortara. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 21, no. 7, July 1955, p. 235-237.

Proposed methods of standardizing malleable iron on the basis of structure and mechanical properties. Diagrams, table, graphs.
(Q general, S22, M general, CI)

885-Q. (German.) **The Significance of the Relationship Between Vickers Hardness and Load.** August Braun. *Zeitschrift für Metallkunde,* v. 46, no. 7, July 1955, p. 499-503.

Elastic resilience, problem and form of load dependence. Graphs, diagrams, tables. 2 ref. (Q29)

886-Q. (Italian.) **Ultrasonic Investigation on Solid State at High Temperatures.** Piero Giorgio Bordoni. *Ricerca scientifica,* v. 25, no. 4, Apr. 1955, p. 847-859.

Elastic and anelastic behavior of metals near their melting point. The dissipation of elastic energy, when it is not affected by any relaxation phenomena, increases with temperature, and a close connection was found between this increase and creep. Graphs. 18 ref.
(Q21, Q3)

887-Q. (Russian.) **Process of Metal Destruction During Creep.** I. A. Oding and V. S. Ivanova. *Doklady Akademii Nauk SSSR,* v. 103, no. 1, July 1, 1955, p. 77-80.

A new interpretation of the process which begins from diffusion of intergranular spaces into "colonies", or micropores, transformation of micropores into microfissures and continuous growth of microfissures resulting in cracks. Diagram. 10 ref. (Q3, Ni)

888-Q. (Russian.) **Application of Radioactive Indicators for Evaluating the Wear of Piston Rings.** P. E. D'iachenko and A. I. Nisnevich. *Vestnik Mashinostroeniia,* v. 35, no. 7, July 1955, p. 19-22.

Determination of dependence of wear on effective pressure and effective power of the engine by radioactive tracers. Diagrams, tables, graphs. 6 ref. (Q9, S19)

889-Q. Photoelastic Investigation in Connection With the Fatigue Strength of Bolted Joints. H. T. Jessop, C. Snell, and G. S. Holister. *Aeronautical Quarterly,* v. 6, Aug. 1955, p. 230-239.

Elastic stress distribution around a circular hole in a flat bar under simple tension, when the hole is filled by a push-fit pin, investigated photo-elastically. Over a range of values of the ratio hole diameter to width of bar, and for pins of differing Young's moduli, the effect of the pin was sensibly the same, namely, to reduce the maximum tension on the hole boundary by about 15% as compared with that in the unfilled hole. Photograph, graphs. 2 ref.
(Q7, Q25, Q21)

890-Q. Study of Brittle Failure in Tank Steels. F. J. Feely, Jr., and M. S. Northup. *American Petroleum Institute, Proceedings,* sec. III. *Refining,* v. 34, 1954, p. 168-179; disc., p. 179-185.

Development of a test to simulate conditions at the time of a tank failure. Efforts to obtain a correlation between test results and fundamental physical properties of the materials tested. Photograph, graphs, diagrams, tables.
(Q26, Q23, ST)

891-Q. Selection of Materials for a Sodium Graphite Reactor System. C. C. Woolsey, Jr. *American Society of Mechanical Engineers, Paper No.* 55—S-16, 1955, 5 p. + 1 plate.

High - temperature mechanical properties of zirconium alloys and stainless steels. Selection criteria include compatibility with other materials in the system, and also their parasitic neutron absorption. Photograph, tables. (Q general, Zr, SS)

892-Q. Tensile Properties of Sheet Zirconium at Room and Elevated Temperatures. A. D. Schwope, S. J. Stockett and G. T. Muehlenkamp. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-T-39, Oct. 1950, 27 p.

Data obtained from a series of tests made on low-hafnium, arc-melted zirconium crystal bar from 70 to 600° F. Tensile strength drops from 38,000 to 17,000 psi. at 600° F.; the "n" value suggests 400° F. or higher for best forming work. Tables, graphs. (Q27, Zr)

893-Q. Weldability and Mechanical Properties of Two Low-Alloy Steels in the Hardened and Tempered Condition. B. J. Bradstreet. *British Welding Journal,* v. 2, Aug. 1955, p. 347-350.

Results of weldability, tensile and impact tests on 1½ in. low alloy steel plate to determine resistance to hard-zone cracking. Tables, graphs, diagram. 3 ref.
(Q general, K9, AY)

894-Q. Impurities in Titanium: Sulphur. D. A. Sutcliffe. *Gt. Brit. Royal Aircraft Establishment. Technical Note* MET. 218, Mar. 1955, 12 p.

Approximately 0.1% sulfur causes a marked rise in tensile strength and hardness with a corresponding fall in elongation and impact strength. More sulfur (up to 1.05%) is deleterious. Tables, graphs, micrographs. 10 ref.
(Q23, Q27, Q29, Q6, Ti, S)

895-Q. Yield Behaviour of Metals at Low Temperatures. H. F. Hall and R. W. Nichols. *Iron and Steel Institute, Journal,* v. 180, Aug. 1955, p. 329-336 + 2 plates.

Carbon steels, low-alloy steels and two nonferrous alloys studied from +200 to −197° C. Tables, graphs, diagrams. 18 ref.
(Q23, CN, AY, Cu, Al)

896-Q. The Errors Introduced Into Diamond Pyramid Hardness Testing by Tilting the Specimen. T. O. Mulhearn and L. E. Samuels. *Iron and Steel Institute, Journal,* v. 180, Aug. 1955, p. 354-358 + 1 plate.

Errors from vertical and horizontal rotation evaluated. Table, graphs, diagram, micrographs. 2 ref. (Q29)

897-Q. Rupture of Heat-Resistant Alloys in Flame Gas Atmospheres. Edward W. LaRocca. *Jet Propulsion,* v. 25, Aug. 1955, p. 396-399.

Rupture of temperature-resistant materials, stressed in combustion atmospheres, reported for two cold-worked commercial alloys at temperatures between 920 and 1150° C. in a burning propane flame. Graphs, tables, micrographs. 17 ref. (Q4, SG-h)

898-Q. Compression of the Alkali Metals to 10,000 Atmospheres at Low Temperature. C. A. Swenson. *Physical Review,* v. 99, ser. 2, July 15, 1955, p. 423-430.

Determinations at 4.2 and 77° K. The unusual features found were an abnormally low decrease in compressibility with pressure for cesium, probably connected with a smearing out of the electronic transition found at 45,000 atmospheres at room temperature, and a possible transformation in rubidium at 77° K. which resulted in a permanent increase in the room-temperature density of about 10%. Diagrams, graphs, tables. 21 ref. (Q28, EG-e-41)

899-Q. Some Properties of Various Binary Molybdenum-Base Alloys. Egon Pipitz and Richard Kieffer. *Powder Metallurgy Bulletin,* v. 7, Aug. 1955, p. 53-59.

Indications that the addition of certain alloying elements affects strongly some of the physical properties of molybdenum such as the recrystallization temperature, toughness, ductility, room temperature hardness and hot hardness. Table, graphs. 9 ref. (Q general, Mo)

900-Q. Some Problems Associated With Stress Concentration. H. L. Cox. *Royal Aeronautical Society, Journal,* v. 59, Aug. 1955, p. 551-561.

Cases of stress and load concentration, investigations of special two-dimensional boundaries with general theoretical conclusions which can be drawn, review of possible reasons why, in practice, the best found conclusions are not always borne out. Graphs, photographs, diagrams. (Q25)

901-Q. Tension-Impact Properties of Austenitic Stainless Steels at Ambient and Low Temperatures. A. Choquet, V. N. Krivobok and G. Welter. *Welding Journal,* v. 34, Aug. 1955, p. 361S-373S.

Static and dynamic properties of several stainless steels determined for base metal and butt welded assemblies. Diagrams, photographs, tables, micrographs, graphs. 3 ref. (Q27, Q6, SS)

902-Q. Modified Navy Tear Test for Measuring the Work of Fracture Propagation in Ductile Metals. Hugh E. Romine. *Welding Journal,* v. 34, Aug. 1955, p. 396S-408S.

Test and application to the study of fracture properties of mild steel plate, ¼-in. thick. Tables, micrographs, photographs, diagrams, graphs. 7 ref. (Q26, ST)

903-Q. Internal Friction of Steel and Temper Brittleness. E. I. Kvashnina and V. I. Prosvirin. *Henry Brutcher Translation No.* 3555, 6 p. (From *Izvestiya Akademii Nauk SSSR,* 1955, no. 1, Jan., p. 157-159.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 609-Q, 1955. (Q22, Q23, ST, Mo, Cr, Mn)

904-Q. (English.) **Nomenclature of Strain Parameters.** A. D. Fokker. *Physica,* v. 21, no. 7, July 1955, p. 575-578.

Defines one, two and three-dimensional strain parameters and shows how to find the parameters from the particle displacements. (Q25)

905-Q. (German.) **Graphic Method of X-Ray Measurement of Deformation.** Günter Kemmnitz. *Archiv für das Eisenhuttenwesen,* v. 26, no. 8, Aug. 1955, p. 437-443.

Theoretical basis of the method, technique of operation, application in case of deformation under uniaxial and biaxial stress. Diagrams, tables. 8 ref. (Q24)

906-Q. (German.) **Possibility of Industrial Application of X-Ray Stress Determination.** Alfred Schaal. *Archiv für das Eisenhuttenwesen,* v. 26, no. 8, Aug. 1955, p. 445-447.

Analysis of X-ray diffraction pattern for the determination of residual stresses (tensile and compression). Industrial application. Photography, graphs, diagrams. 9 ref. (Q25, M22)

907-Q. (German.) **Comparison of Deformation of Cast Iron Determined by X-Ray Diffraction and Mechanical Methods.** Viktor Hauk. *Archiv für das Eisenhüttenwesen,* v. 26, no. 8, Aug. 1955, p. 449-453.

Method of investigation, practical results, demonstration of the behavior of different sizes and shapes of graphite in gray cast iron under various stresses. Micrographs, tables, graphs. 12 ref. (Q24, M22, CI)

908-Q. (German.) **Behavior of Surface Layer and Elastic Constants of Steel With 0.43% C Established by X-Ray Diffraction Stress Determination.** Hans Hendus and Christian Wagner. *Archiv für das Eisenhüttenwesen,* v. 26, no. 8, Aug. 1955, p. 455-461.

X-ray diffraction determination of residual stress development in steels with 0.16, 0.43 and 0.76% C. Technique of determination. Micrographs, tables, diagrams, graphs. 24 ref. (Q25, M22, ST)

909-Q. (German.) **Changes in Crystal Structure of Chromium-Nickel-Molybdenum Steels During Long-Time Creep Test Under Load at 500 C.** Franz Wever, Alfred Krisch and Hans-Joachim Wiester. *Archiv für das Eisenhüttenwesen,* v. 26, no. 8, Aug. 1955, p. 463-474.

Sixteen-thousand-hour creep testing of five low-alloy steels differently heat treated. Relation between carbide phase and creep behavior. Tables, graphs, micrographs. 29 ref. (Q3, AY)

910-Q. (German.) **Electron Microscopic Investigation of Crystal Structure Changes of Chromium-Nickel-Molybdenum Steels Under Long-Time Tensile Stress at 500° C.** Franz Wever and Angelica Schrader. *Archiv für das Eisenhüttenwesen,* v. 26, no. 8, Aug. 1955, p. 475-481.

Composition of steels, heat treatment, method of investigation, analysis of results. Table, micrographs. 12 ref. (Q3, M26, AY)

911-Q. (German.) **Testing the Creep-Stress Resistance of Boiler Metals in the Acceptance of Materials.** K. Wellinger and E. Keil. *Brennstoff-Wärme-Kraft,* v. 7, no. 8, Aug. 1955, p. 354-356.

Short-time experiments at operating temperatures to determine validity of standard creep tests and effect of previous annealing on creep strength of boiler steels. Graphs, micrographs. 3 ref. (Q3, ST)

912-Q. (Japanese.) **Some Problems on Nip Stresses (Stress Distribution, Caused by Nipping, in the Leaves of a Spring).** Katsunobu Tomita, Shinichi Watanabe and Takeshi Hirai. *Journal of Railway Engineering Research (Japan),* v. 12, no. 9, May 10, 1955, p. 199-215.

Experiments to determine measures for prevention of fatigue deformation. Graphs, tables, diagrams. 14 ref. (Q25, Q24, CN)

913-Q. (Japanese.) **Dynamical Strength of Railway Track.** Yutaka Sato. *Journal of Railway Engineering Research (Japan),* v. 12, nos. 10-11, June 10, 1955, p. 225-278.

Examination of the dynamical property of railway track, to find its destruction mechanism, and the key point for its strengthening. Tables, graphs, diagrams, photographs. 42 ref. (Q23)

914-Q. (Japanese.) **Steel-Core Cast Iron: Special Qualities, Method of Manufacture, and Specifications.** Taichiro Usui. *Metals (Japanese),* v. 25, no. 8, Aug. 1955, p. 585-589.

Three types of linking zone between steel core and cast iron. Microstructure and mechanical properties including strength and hardness. Tables, graphs, micrographs. 6 ref. (Q general, M27, CI)

915-Q. (Norwegian.) **Measuring With Strain Gages. Process and Accuracy.** Strekklappmalinger. Just Fr. Storm. *Teknisk Ukeblad,* v. 102, no. 28, Aug. 11, 1955, p. 593-602.

Different types of strain gages and uses on different surfaces; computation of stresses. Diagrams, photographs, graphs. 6 ref. (Q25)

916-Q. (Russian.) **Phosphorus in Magnesium Cast Iron.** K. I. Vashchenko and L. Sofroni. *Liteinoe Proizvodstvo,* 1955, no. 7, July, p. 12-17.

Influence of phosphorus on mechanical properties, crystal structure, solidification properties and shrinkage. Tables, graphs, micrographs. 7 ref. (Q general, M26, E25, CI)

917-Q. The Fatigue of Metals. Philip Thornton. *Discovery,* v. 16, Sept. 1955, p. 374-376.

Explanation of fluctuating loads as a possible cause of brittle fracture and the effect of inclusions on discontinuity in the metal structure. Photograph, diagram, micrograph. 5 ref. (Q7)

918-Q. Loosening and Fatigue Strength of Bolted Joints. M. Boomsma. *Engineer,* v. 200, Aug. 26, 1955, p. 284-286.

Surveys and comments upon existing knowledge about the loosening of bolted joints under variable tension loads; effect of bolt length and diameter on loosening; fatigue strength of bolted joints with comparatively rigid abutments. Graphs, diagrams, tables. 12 ref. (Q7)

919-Q. The Use of Radio-Active Isotopes in the Study of Wear of Machine Parts. B. D. Grozin. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/-P/713, June 1955, 21 p. (Translated from the Russian.)

Advantages include high sensitivity, simultaneous establishment of wear during work without disassembling the machines, automatic recording of wear processes, application of radiography in studying metal-transfer and diffusion. Graphs, micrographs, diagrams, tables. (Q9, N1, S19)

920-Q. Simple Equipment Opens Research Door. Richard A. Flinn and Paul K. Trojan. *Modern Castings and American Foundryman,* v. 28, Sept. 1955, p. 62-65.

Development of a method for the metallographic observation of a specimen under stress. Microscope, microbend tester and polished metal strip combine to give new tool for studying flow and fracture of metals. Diagrams, photographs, micrographs. (Q5, Q24, Q26, M27)

921-Q. (English.) **A Study of Primary and Conjugate Slip in Crystals of Alpha-Brass.** G. R. Piercy, R. W. Cahn and A. H. Cottrell. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 331-338.

Overshooting in alpha-brass crystals as a result of the difficulty which slip on the conjugate system experiences in cutting through the active primary slip lines. Graphs, diagrams, micrographs, photographs. 26 ref. (Q24, Cu)

922-Q. (English.) **A Theory of Fracture and Fatigue.** N. F. Mott. *Physical Society of Japan, Journal,* v. 10, no. 8, Aug. 1955, p. 650-656.

Concept of a piled-up group of dislocations and its relation to ductile and brittle-fracture and fatigue. Diagrams. 14 ref. (Q26, Q7)

923-Q. (French.) **Elastic Modulus and Internal Friction of Polygonized Aluminum.** J. Friedel, C. Boulanger and C. Crussard. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 380-391.

Observation in polygonized coarse-grained aluminum, at elevated temperature, of strong drop of Young's modulus while the internal friction reaches high values. Table, photographs, graphs, diagrams. 29 ref. (Q21, Q22, Al)

924-Q. (German.) **The Ideal Orientations of a Rolling Texture.** Johanna Grewen and G. Wassermann. *Acta Metallurgica,* v. 3, no. 4, July 1955, p. 354-360.

Comparative study of the rolling texture of aluminum foil by the texture goniometer. Investigation was made as to the manner in which this variation affects the interpretation of the texture by means of ideal orientations. Graphs, diagrams, table. 13 ref. (Q24, Al)

925-Q. (German.) **Effect of Heat-Treatment on the Strength and Notch Toughness of Hot-Working Tool Steels.** Karl Bungardt, Gustav Hoch and Otto Mülders. *Stahl und Eisen,* v. 75, no. 16, Aug. 11, 1955, p. 1035-1046.

Establishes mathematical formulas for the dependency on time and temperature of changes in the properties governed by diffusion, effect of austempered structure on the stability of temper and notch toughness, improvement of notch toughness by double or multiple tempering. Table, graphs. 10 ref. (Q23, J29, N1, TS)

926-Q. (German.) **The Problem of the Stress' Limit of Hard Metals.** J. Hinnüber. *Technische Mitteilungen Krupp,* v. 13, no. 3, July 1955, p. 66-68.

Strength of hard metal and cemented carbide cutting tools at machining temperatures. Graphs, photograph, micrographs. 2 ref. (Q23, G17, EG-d, C-n)

927-Q. (German.) **Magnetic Investigations on the Orientation and Amplitude Distribution of Internal Stresses in Plastically Expanded Metals.** Ludwig Reimer. *Zeitschrift für angewandte Physik,* v. 7, no. 7, July 1955, p. 332-336.

Measurement of remanence and remanence change on cube-shaped specimens of nickel and iron deformed by tensile and compression stresses indicate that the main-stress direction deviates by no more than 10° from the direction of applied stress. Table, graphs, diagrams. 13 ref. (Q25, P16, Fe, Ni)

928-Q. (Polish.) **Measurement of the Moment of Friction in the Bearings of Precision Instruments.** Roman Calikowski. *Technika lotnicza,* v. 10, no. 4, July-Aug. 1955, p. 98-103.

Friction meter and formulas for calculating moment of friction in the bearings of aircraft instruments and magnetic compass. Table, diagrams, graph. 8 ref. (Q9)

929-Q. (Russian.) **Strength and Plastic Properties of Complexly Alloyed Construction Steel.** M. P. Braun and E. E. Maistrenko. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1955, no. 6, June, p. 119-126.

Chemical compositions of the steels, comparison of mechanical characteristics of steels, after quenching and high-temperature tempering, effect of tempering temperatures on mechanical properties. Tables, graphs. 2 ref. (Q general, P13, AY)

930-Q. (Russian.) **Physical Bases of the Strength of Materials.** S. T. Konobeevskii. *Vestnik Akademii Nauk SSSR,* v. 25, no. 7, July 1955, p. 15-22.

Theoretical background and present concepts; dislocations in single metallic crystals; elastic and plastic deformation of different orders; diffusion mechanism of plasticity. (Q general, M26)

931-Q. (Russian.) **Method of Determining the Residual Stresses in Butt Welded Joints of Tubes Made of Steel With Different Coefficient of Thermal Expansion.** A. S. Gel'man and V. S. Popov. *Zavodskaia Laboratoriia,* v. 21, no. 6, June 1955, p. 722-724.

Description of the method, influence of heat treatment, after welding, on determination. Diagrams, tables. 1 ref. (Q25, P11, ST)

932-Q. (Russian.) **Methods of Determining the Microhardness of the Working Surface of the Cylinder of an Internal Combustion Machine.** M. M. Khrushchov, E. S. Berkovich, M. D. Krashchin, K. A. Krylov and A. V. Andreeva. *Zavodskaia Laboratoriia,* v. 21, no. 7, July 1955, p. 844-947.

New testing devices and their use. Chrome plated and other surfaces were tested. Photographs, micrograph. (Q29)

933-Q. (Russian.) **Influence of the Deformation Rate on the Mechanical Characteristics of Steel Obtained by Tensile Testing.** F. F. Pedanov. *Zavodskaia Laboratoriia,* v. 21, no. 7, July 1955, p. 847-849.

Effects of strain rate on results of tensile tests. Graphs, table. (Q27, ST)

934-Q. (Book.) **Bibliography on the Fatigue of Materials, Components and Structures.** J. Y. Mann, compiler. v. I. 1843-1938. 288 p. 1954. Commonwealth of Australia, Department of Supply, Research & Development Branch, Aeronautical Research Laboratories, Melbourne, Australia.

Entries are listed for each year. (Q7)

935-Q. (Book.) **Bibliography on Residual Stress.** T. C. Huang. 196 p. 1954. Society of Automotive Engineers, 29 West 39th Street, New York 18, N. Y.

Measurement, occurrence, control, removal, and effects of residual stresses. (Q25)

936-Q. (Book.) **Studies in the Behavior of Certain Nonferrous Metals at Low Temperatures.** PB 111657. Final Report, v. I. 157 p. 1953. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $4.00.

Use of tantalum at temperatures down to −100° F. without impairment of its mechanical properties. Effect of modulus of elasticity and grain size on the low-temperature properties of copper and silver. (Q general, Cu, Ag, Ta)

R — Corrosion

358-R. Cavitation-Pitting by Instantaneous Chemical Action From Impacts. Irving Taylor. *American Society of Mechanical Engineers, Paper No.* 54—A-109, 1954, 11 p.

Some ideas and contentions on the cavitation pitting that occurs when the impacts release hydroxyl radicals in water or release ions in liquid metals. Table. (R2)

359-R. Resistance of Tubular Materials to Sulphide-Corrosion Cracking. J. P. Fraser and R. S. Treseder. *ASME, Transactions,* v. 77, Aug. 1955, p. 817-822; disc., p. 822-825.

Laboratory test procedure for rating alloys as to their resistance to sulphide-corrosion cracking. Tables, photographs. 7 ref. (R11)

360-R. The Sulphurization-Resistant Property of Spheroidal Graphite Cast Iron at High Temperatures. Masakazu Shiozawa and Hiroshi Nakai. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 12-14.

No significant difference exists between spheroidal graphite and ordinary cast iron; the shape of graphite exerts no serious affect, but alloy elements, which dissolve in matrices, seriously affect the resistant property. Tables, micrograph. 2 ref. (R9, CI)

361-R. The Pertechnetate Ion as an Inhibitor of the Corrosion of Iron and Steel. G. H. Cartledge. *Corrosion,* v. 11, Aug. 1955, p. 335-342.

A study of the inhibition of corrosion of electrolytic iron, mild steel and cast iron in aerated water by the use of low concentrations of potassium pertechnetate. Tables, photographs, graphs. 17 ref. (R10, CI, Fe, CN)

362-R. Design and Application of Corrosion Current Measuring Instruments. Donald L. Ham. *Corrosion,* v. 11, Aug. 1955, p. 343-346.

Three principal kinds of instruments used to measure currents associated with corrosion. Circuit diagrams. (R11)

363-R. Design Against Atmospheric Corrosion. Henry T. Rudolf. *Corrosion,* v. 11, Aug. 1955, p. 347-350.

Series of observations, suggestions and recommendations, based on practical experience, for construction of metallic surfaces exposed to corrosion. Diagrams. (R3, Fe, ST)

364-R. Stress Corrosion Cracking of Hardenable Stainless Steels. F. K. Bloom. *Corrosion,* v. 11, Aug. 1955, p. 351-361.

Results of tests exploring effects of heat treatment on susceptibility of various stainless steels to corrosion cracking in a variety of corrosive media. Photographs, diagrams, tables, graphs, micrographs. 11 ref. (R1, SS)

365-R. The Electrochemistry of Inhibitor Action. R. B. Mears. *Corrosion,* v. 11, Aug. 1955, p. 362-364.

Electrical terms used to explain inhibiting action of substances and to show what properties are desirable in an inhibitor. The mechanism by which sodium chromate and sodium hexametaphosphate function as inhibitors. Graphs, table. 3 ref. (R10)

366-R. (French.) **Insulating Coatings and Their Influence on the Cathodic Protection of Ferrous Metals by Means of Magnesium Anodes.** B. Raclot. *Métaux, Corrosion-Industries,* v. 30, no. 358, June 1955, p. 258-261.

Importance of the combination of coating properties and cathodic protection, depending upon the nature of the insulating material and conditions of application. Tables, graphs. (R10, ST)

367-R. (German.) **Electrochemical Investigations of the Corrosion of Alpha-Iron Monocrystals in Dilute Acids.** Hans-Jürgen Engell. *Archiv für das Eisenhüttenwesen,* v. 26, no. 7, July 1955, p. 393-404.

Effect of type and concentration of acid, temperature and crystal orientation on rate of corrosion; study of etched surface structures, interpretation of test results. Graphs, diagrams, tables, micrographs. 18 ref. (R5, M26, Fe)

368-R. (German.) **Practical Application of Zinc Anodes for the Cathodic Protection of Pipelines.** B. Trautmann. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 649-651.

Current required for anodes under different soil conditions; properties of zinc anodes; types of backfill for different soils and factors affecting the economy of this method. Tables, graphs, diagram. 2 ref. (R10, CN)

369-R. (German.) **Behavior of Fine Zinc Alloys Under Tropical Conditions.** W. Wolf. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 655-658.

Intercrystalline corrosion of pressure cast $ZnAl_4$ and $ZnAl_4Cu$ alloys under hot humid conditions, resulted primarily from lead, cadmium and tin; embrittlement and change in dimensions due to aging; effect of temperature on mechanical properties and of humidity and temperature changes on surface corrosion; methods of protecting the surfaces of zinc alloys against corrosion. Photographs, graphs. 6 ref. (R3, Q general, Zn)

370-R. (German.) **Short-Time-Tests in a New Test Chamber for Corrosion.** W. Hess. *Werkstoffe und Korrosion,* v. 6, no. 7, July 1955, p. 325-328.

Apparatus which produces a fine, homogeneous fog; advantages and applications. Photographs, tables, diagram. (R11)

371-R. (German.) **On the Mechanism of the Corrosion of Iron in Soils.** T. Markovic, Z. Dugi and B. Sribar. *Werkstoffe und Korrosion,* v. 6, no. 7, July 1955, p. 334-337.

Rate of corrosion depends on pH-value of the soil if the corrosion of the iron takes place under an excess of oxygen. Laboratory experiments with soft steel specimens show that corrosion of iron in unsaturated soils is a reaction of the first order, in water-saturated soils it follows the law of diffusion. Graphs, tables. (R8, Fe)

372-R. Significance of Slime in Causing Corrosion and Mechanisms of Corrosion by Slime Growth. R. S. Wise. *American Society of Mechanical Engineers, Paper No.* 55—S-40, 1955, 8 p. + 1 plate.

Corrosion rate is increased by bacteria in cooling-tower systems by a combination of several mechanisms. Total corrosion rate in the presence of slime may easily be double that in the absence of slime as indicated by controlled laboratory tests. Photographs, graphs, tables. 13 ref. (R1, R4)

373-R. Attack on Metals by Bismuth-Lead-Tin Alloy at Elevated Temperatures. Walter D. Wilkinson. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5262, Jan. 1955, 73 p.

The alloy 52% bismuth-32% lead-16% tin by wt. does not attack molybdenum at 800° C. or beryllium at 500° C. Aluminum, titanium and zirconium were damaged, iron is insoluble but subject to intergranular attack. Tables, graph, diagrams, photographs, micrographs. 7 ref. (R6, AY, Be, Mn, ST, SS, Ti, Zr)

374-R. The Initial Oxidation of Nickel. Ursula M. Martius. *Canadian Journal of Physics,* v. 33, Aug. 1955, p. 466-472.

Specific features of the oxidation of grain boundaries; tentative explanation of observed phenomena. Micrographs. 9 ref. (R2, Ni)

375-R. Corrosion of Metal Containers. R. K. Sanders. *Corrosion Technology,* v. 2, Aug. 1955, p. 238-242.

Considers tinplate, "blackplate" and aluminum in their roles as structural metals for containers and outlines their corrosion characteristics under varying conditions. Reviews contemporary literature. Photographs. 10 ref. (R general, Sn, Al)

376-R. Dezincification of Brasses in Marine Environments. L. Kenworthy and W. G. O'Driscoll. *Corrosion Technology,* v. 2, Aug. 1955, p. 247-249.

Description, mechanism, effects of alloying elements. Photographs. 25 ref. (R2, R3, Cu)

377-R. The Corrosive Nature of Combustion Gases From Carbon Monoxide Flames Containing Sulphur Oxides. G. Whittingham. *Journal of Applied Chemistry,* v. 5, July 1955, p. 316-322.

Mild steel corrosion was at a maximum from 66 to 70° C. and combustion air humidity had a significant effect. Tables. graphs, diagram. 15 ref. (R9, CN)

378-R. The Kinetics of the Reaction of Elementary Fluorine With Copper Metal. P. E. Brown, J. M. Crabtree, and J. F. Duncan. *Journal of Inorganic and Nuclear Chemistry,* v. 1, June 1955, p. 202-212.

Studied under high vacuum from room temperature to 250° C. and from 6 to 60-mm. mercury pressure. Tables, graphs, diagram. 10 ref. (R6, Cu, Fe)

379-R. Inhibition of Acid Dissolution of Metals. I. Some General Observations. A. C. Makrides and Norman Hackerman. *Journal of Physical Chemistry,* v. 59, Aug. 1955, p. 707-710.

Mechanism for inhibition of metal dissolution and important parameters pointed out. Tables. 17 ref. (R10)

380-R. How Copper-Base Alloys Have Reduced Condenser-Tube Corrosion in Marine Service. C. L. Bulow. *Marine Engineering,* v. 60, Sept. 1955, p. 59-67.

Properties of individual alloys tabulated and their performance in different types of service. Tables, photographs, micrographs. (R3, Cu)

381-R. Cathodic Protection on the Biggest Inch Line. II. N. K. Senatoroff and W. M. Schilling. *Pipe Line News,* v. 27, Aug. 1955, p. 50 + 9 pages.

Details of a $100,000 complete cathodic protection system for 30-in. wrapped gas line. Tables, graphs, diagrams. 6 ref. (R10, ST)

382-R. The Prevention of Corrosion During Storage and Transit. C. F. McCue. *Sheet Metal Industries,* v. 32, no. 340, Aug. 1955, p. 565-569; disc., p. 569-571.

Types of temporary protectives, selection of correct type of protective, causes of failure. Graphs. 3 ref. (R10)

383-R. On Heat and Sulphur-Resisting Alloys. H. Gruber. *Henry Brutcher Translation No.* 918, 21 p. (From *Zeitschrift für Metallkunde,* v. 23, no. 5, 1931, p. 151-157.) Henry Brutcher, Altadena, Calif.

Influence of gaseous sulfur upon nickel and chrome-nickel alloys at elevated temperatures. Factors improving the resistance to the action of sulfur; physical properties of layer of scale; general significance of physical factors in regard to the resistance to gaseous sulfur. Graphs, micrographs, tables. (R9, SG-h)

384-R. On One Form of Intergranular Corrosion in Welds in Stabilized 18-8 Steel (Knife-Line Attack). Yu. I. Kazennov. *Henry Brutcher Translation No.* 3552, 5 p. (From *Avtomaticheskaya Svarka,* v. 9, no. 2, 1955, p. 91-93.) Henry Brutcher, Altadena, Calif.

Study of conditions for incidence and ways of suppressing intergranular knife-line attack in titanium and columbium-stabilized 18-8 steels. Photographs, diagrams, table. 2 ref. (R2, SS)

385-R. Water Corrosion of Structural Materials. A. H. Roebuck. Paper from "Fifteenth Annual Water Conference, Proceedings". Engineer's Society of Western Pennsylvania, p. 165-177; disc., p. 177-185.

Corrosion mechanisms and tests on various metals and alloys. Tables, photographs, diagrams, graphs. 7 ref. (R4)

386-R. A New Approach in Corrosion Prevention for Cooling Water Systems. H. Lewis Kahler and Charles George. Paper from "Fifteenth Annual Water Conference, Proceedings". Engineer's Society of Western Pennsylvania, p. 187-193; disc., p. 193-197.

Use of soluble zinc or zinc coatings to supplement the action of corrosion inhibitors. Tables. 5 ref. (R10, L16)

387-R. (German.) **Process for the Prevention of Corrosion—General Report.** Willi Machu. *Chemie-Ingenieur-Technik,* v. 27, no. 7, July 1955, p. 403-409.

Economic importance of corrosion problems and considerable variety of corrosion phenomena, methods used in technology for protection against corrosion, summary of lectures held at the "Corrosion Convention" 1954 in Frankfurt/Main. 16 ref. (R general)

388-R. (German.) **The So-Called Well-Water Blackening of Aluminum and Its Prevention.** D. Altenpohl. *Metalloberfläche,* Ausgabe A, v. 9, no. 8, Aug. 1955, p. 118-121.

Effect of hard tap and well water on pure aluminum and aluminum alloys, chemical preventive measures, methods of testing an aluminum surface for its susceptibility to blackening, protective effect of a bohmite film. Micrographs, photographs, table. 4 ref. (R4, Al)

389-R. (German.) **Contribution to the Corrosion-Chemical Behavior of Titanium.** K. Jordan and R. W. Fischer. *Technische Mitteilungen Krupp,* v. 13, no. 2, May 1955, p. 44-47.

Corrosive effects of acids, hydroxide salts and gaseous halogens on titanium as functions of temperature and time. Tables. 8 ref. (R6, R7, R9, Ti)

390-R. Copper Alloy's Corrosion Resistance to Ammonia Improved by Good Design, Stress Relieving. I. S. Levinson. *Corrosion,* v. 11, Sept. 1955, p. 365.

When exposed to 14% ammonium hydroxide at 212° F., heat treated copper was superior, more severe attack was in the vapor phase. Tables, photograph. (R6, Cu)

391-R. Principles Applicable to the Oxidation and Corrosion of Metals and Alloys. W. W. Smeltzer. *Corrosion,* v. 11, Sept. 1955, p. 366-374.

Theory for formation of compact films on pure metals is well developed. General principles of films on alloys are made for aluminum alloys. Tables, graphs, diagrams. 59 ref. (R1, R2, Al)

392-R. The Porosity of the Aluminum Surface Investigated by the Repetitive Oscillographic Method. W. Machu, E. M. Khairy and M. K. Hussein. *Corrosion,* v. 11, Sept. 1955, p. 375-378.

Anodic passivity of aluminum, studied in a variety of electrolytes, shows that two types of reactions occur: electrochemical and chemical. Tables, graph, circuit diagram, oscillogram. 4 ref. (R11, Al)

393-R. Corrosion of Materials Subjected to Locomotive Smoke and Funnel Blast. T. Marshall and R. M. Sinclair. *Corrosion,* v. 11, Sept. 1955, p. 379-382.

Tests on various constructional materials and protective coatings exposed to smoke, steam and direct funnel blasts indicate that molybdenum-bearing austenitic stainless steel and vitreous-enamelled steel are highly resistant to deterioration. Tables. 4 ref. (R9, R4, SS)

394-R. Atmospheric Galvanic Couple Corrosion. K. G. Compton, A. Mendizza, and W. W. Bradley. *Corrosion,* v. 11, Sept. 1955, p. 383-392.

Measurements of weight losses of couples in marine, industrial and severe tropical atmospheres to predict their probable relative behavior. Tables, graphs, diagram, photographs. 20 ref. (R3, R1)

395-R. Countermeasures for Control of Internal Corrosion of a Tanker Ship. Charles P. Dillon. *Corrosion,* v. 11, Sept. 1955, p. 393-405.

Recommends concurrent inhibition of cargo with an oil-soluble inhibitor and treatment of empty tanks with a soluble-oil inhibited salt water wash. Reduction of corrosion up to 75% is expected with a net annual savings on the order of $65,000. Photographs, tables, diagram. 14 ref. (R7, R10)

396-R. Valves for Corrosive Fluids. E. G. Holmberg. *Corrosion,* v. 11, Sept. 1955, p. 406-414.

Presents method for selection of valves for control of corrosive fluids; means of selecting suitable alloys and case histories of valve failures from corrosion are given and analyzed. Tables, diagrams, photographs. (R6, R7, T7, AG-g)

397-R. Fretting Corrosion on a Screwed Joint Under Prolonged Fatigue Loading. J. E. Field. *Engineer,* v. 200, Aug. 26, 1955, p. 301-303.

Tests on the reduction of the inherent fatigue resistance of a part subject to fluctuating stresses by fretting corrosion. Photographs, diagrams, table. (R1, Q7)

398-R. Corrosion by Liquid Metals. Leo F. Epstein. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/119, July 1955, 22 p.

Interest in liquid metals, as heat transfer fluids, has brought about need for information on corrosion by these materials. Photographs, tables, diagrams, graphs. 3 ref. (R6)

399-R. Fretting and Fretting Corrosion. *Lubrication,* v. 41, Aug. 1955, p. 85-96.

Scope, detection, mechanism. Effects of lubrication and other factors which influence fretting. Photographs, diagram, tables. 26 ref. (R1)

400-R. Recent Developments in Chromium Diffusion. III. Application and Properties of Chromised Metals. R. L. Samuel, N. A. Lockington and H. Dorner. *Metal Treatment and Drop Forging,* v. 22, Aug. 1955, p. 336-340.

Properties of chromized steels including corrosion, heat and wear-resistance. Applications of such components. Graphs, tables. 9 ref. (R general, Q9, L15, Cr)

401-R. Aluminum Corrosion Control in Refrigeration Service. R. L. Hadley. *Refrigerating Engineering,* v. 63, Aug. 1955, p. 40-43, 100.

Mechanism of pitting corrosion of aluminum and other corrosion problems; control measures. Graph, diagrams, photographs. 6 ref. (R2, Al)

402-R. A Rust-Resistance Test for Tinplate. S. C. Britton and D. G. Michael. *Sheet Metal Industries,* v. 32, no. 340, Aug. 1955, p. 576-580.

Tin Research Institutes new method of porosity measurement for estimating resistance. Micrographs. 4 ref. (R11, Sn)

403-R. (German.) **Corrosion and Protection Against Corrosion in Shipbuilding.** K. Sautner. *VDI Zeitschrift,* v. 97, no. 22, Aug. 1, 1955, p. 747-752.

Causes of corrosion inside and outside a ship and preventive measures by cathodic means, chemical inhibitors and removal of moisture from storage tanks. Graph, photographs, table, diagrams. 28 ref. (R10)

404-R. (Russian.) **Methods of Corrosion Protection of Modern Anti-friction Alloys.** B. V. Losikov. *Vestnik Mashinostroeniia,* v. 35, no. 8, Aug. 1955, p. 58-60.

Corrosion process of copper, cadmium, lead and tin alloys; factors inducing corrosion; methods of protection. Tables. 9 ref. (R10, Cd, Cu, Pb, Sn)

405-R. (Russian.) **Laboratory Installation for the Service Testing of Pump Piston Rods for Corrosion Fatigue.** R. A. Bagramov. *Zavodskaia Laboratoriia,* v. 21, no. 7, July 1955, p. 864-866.

Testing simulates actual oil-well pumping conditions, including variable asymmetric loads. Diagrams, graphs. (R1, R11, ST)

406-R. (Book.) **Bibliographic Survey of Corrosion, 1950-1951.** Publication No. 55-4. 435 p. 1955. National Association of Corrosion Engineers, 1061 M & M Building, Houston 2, Texas. $12.50 ($10.00 to NACE members).

A compilation of corrosion abstracts from English and foreign journals. (R general)

407-R. (Book.) **Water Treatment Prevention of Scale in Sea Water Distillation.** Report PB 111569. 104 p. 1953. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $3.25.

Thermocompression stills, used with some stabilized sea waters, show promising performance in a citric acid cycle; sea water composition shows considerable variation. (R4)

S

Inspection and Control

227-S. Inspection Procedures for the Acceptance or Rejection of Incoming Steel Shipments. D. J. Heinlen. *American Society of Mechanical Engineers, Paper No.* 54—A-209, 1954, 8 p. + 7 plates.

Working plan to attack the problem, not only from the inspection standpoint, but also from the specification angle. Tables, photographs, graphs. (S10, S22, ST)

228-S. The Application of Statistics to Simple Fixed-Gage Design. H. C. Charbonneau. *ASME, Transactions,* v. 77, Aug. 1955, p. 949-955; disc., p. 955-956.

The application of statistics to quality control, design and selection of gages, application of unilateral and bilateral theories of tolerances. Tables, graphs, diagrams. (S12)

229-S. Recent Developments in Optical Tooling. K. H. Boucher. *Automotive Industries,* v. 113, Aug. 15, 1955, p. 50-52, 154.

Use of closed circuit television, micro-alignment telescope, targets and a precision check bar for checking major assembly fixtures. Photographs, diagram. (S14)

230-S. On Segregation of Castings by Spectrographic Analysis. II. Kazuo Yasuda and Kiichiro Amano. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 49-54.

Spark method of determining segregation of magnesium, silicon and manganese in wedge-shaped castings of spheroidal graphite cast iron. Diagrams, micrographs, graphs. (S11, CI)

231-S. Application of Ultrasonic Flaw Detection Method for Cast Iron (Fatigue Test). Hiroshi Yamanouchi and Takeshi Inukai. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 55-57.

Tracing of crack propagation and ultrasonic attenuation in cast iron under repeated stress (rotating beam fatigue test). Graphs, echo patterns. (S13, Q7, CI)

232-S. Inspection, Explosion and Breakdown of Boilers and Pressure Vessels. J. Eyers. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 8, 1955, p. 181-188 + 8 plates; disc., p. 189-203.

Diagnosis of several serious breakdowns and explosions, many of which are caused by low water conditions. Graphs, diagrams, photographs, micrographs. (S21)

233-S. Non-Destructive Testing. III. Radiography. J. M. McLeod. *Iron & Steel,* v. 28, Aug. 1955, p. 397-402.

Location of defects, use of penetrameters, xeroradiography, gamma-radiography, examination of welds, castings, thickness measurements and acceptance standards. 62 ref. (S13, S14)

234-S. A Small Pneumatic Pyrometer. A. M. Godridge, R. Jackson, and G. G. Thurlow. *Journal of Scientific Instruments,* v. 32, July 1955, p. 279-282.

Theory of the pneumatic pyrometer, in which gas temperature is determined from density measurements, design and characteristics of a small instrument. Calibration curves covering a wide temperature range (200 to 1550° C.). Use of the instrument. Diagrams, graph. 6 ref. (S16)

235-S. Standard Types of Stainless and Heat Resisting Steels. *Materials & Methods,* v. 42, Aug. 1955, p. 131.

Chemical ranges and limits for 37 types. Table. (S22, SS)

236-S. Metals "Custom-Tailored" Through Controlled Heat Treating. John J. Kennedy. *Metal Treating,* v. 6, July-Aug. 1955, p. 16-18, 39.

Measurement and control of temperature during heat treating operations. Photograph, diagram. (S16, J general)

237-S. Quality Control: A Welding 'Must'. E. C. Osborne. *Welding Engineer,* v. 40, Aug. 1955, p. 38-39, 46.

Hows and wherefores of establishing effective quality control measures in the shop. Photograph, charts. (S12, K general, ST)

238-S. (German.) **Superposition of Diffraction Spots on Radiographs.** F. Ebert and H. G. Diercks. *Aluminium,* v. 31, nos. 7-8, July-Aug. 1955, p. 335-337.

Diffraction spots from X-ray flow analysis of light metals can be identified by this rapid displacement when the specimen is touched. Diagrams, photograph, radiographs. (S13, M22)

239-S. (German.) **Analysis of the Residues of Pig Iron and Cast Iron. II. Separation of the Isolates.** Adalbert Wittmoser and Wolf-Dietrich Gras. *Archiv für das Eisenhüttenwesen,* v. 26, no. 7, July 1955, p. 379-388.

New method of isolating structural constituents of iron by magnetism and flotation. Tables, diagrams, micrographs, photograph. 17 ref. (S11, M23, CI)

240-S. (German.) **Temperature Measurement in the Open-Hearth Steel Plant.** Günther Boos and Jacob Willems. *Stahl und Eisen,* v. 75, no. 14, July 14, 1955, p. 900-906.

Experiments with immersion thermocouples on three steel grades from tapping to pouring; temperature difference between black and color temperature and conclusions to be drawn for the steel quality; temperature loss during ladling. Graphs. 18 ref. (S16, D2, ST)

241-S. (Italian.) **The Betatron in Industrial X-Ray Inspection.** Bartolomeo Bellion and Carlo Tribuno. *Ricerca scientifica,* v. 25, no. 6, June 1955, p. 1400-1414.

Use and advantages of 31 mev. betatron operating in Turin, Italy. Radiographs, table, photographs, graphs. 12 ref. (S13)

242-S. Results of the Survey of the Study Group on Oil Storage-Tank Failures. Carl H. Samans. *American Petroleum Institute, Proceedings,* sec. III. *Refining,* v. 34, 1954, p. 143-163; disc., p. 179-185.

Study of questionnaires covering 23 failures out of approximately 6000 tanks in service. Failure causes and histories. Tables, diagrams. (S21)

243-S. Some Economic Aspects of the Oil Storage-Tank Failure Problem. F. A. Gitzendanner. *American Petroleum Institute, Proceedings,* sec. III. *Refining,* v. 34, 1954, p. 164-167; disc., p. 179-185.

Failure probabilities, insurance costs versus failure possibilities. Tables. (S21)

244-S. Surface Roughness and the Design Engineer. Joseph Manuele. *American Society of Mechanical Engineers, Paper No.* 55—S-11, 1955, 7 p. + 2 plates.

Important features of the proposed American Standard for surface roughness, waviness and lay. Shows how standard may be used by the engineering department to determine surface-roughness values and the importance of choosing the proper instrument for measuring surface roughness. Graphs, table. (S15, S22)

245-S. Electronic Aids Speed Quality Control. J. M. Thompson and S. Maszy. *Aviation Week,* v. 63, Aug. 29, 1955, p. 56, 59, 61, 62.

Electronic instruments developed for the determination of internal structures and composition of parts and materials. Photographs. (S general)

246-S. Automatic Control of Metallurgical Furnaces. H. C. Dawson. *Canadian Metals,* v. 18, Aug. 1955, p. 20-22, 24-25.

Change-over from hydraulic to pneumatic or electronic control permits greater flexibility with acceptable safety. Diagram, photographs. (S16, S19)

247-S. Ultrasonic Transmission Tester Speeds, Simplifies Production Inspection. N. W. Schubring. *Iron Age,* v. 176, Aug. 4, 1955, p. 87-90.

Where both sides of a test piece are accessible, this nondestructive tester offers the speed, simplicity and economy desired for production inspection. Graphs, diagram, photographs. 4 ref. (S13)

248-S. Thermocouple Measurements in an RF Field. Loren E. Bollinger. *ISA Journal,* v. 2, Sept. 1955, p. 338-340.

In induction heating, the temperature of the heated material can most easily be measured by thermocouples in the range from 1000° K. to ambient conditions. Precautions must be taken to insure that the unavoidable R.F. pick-up by the thermocouple is sufficiently attenuated to validate the measurement. Filter circuits to accomplish this task are presented and the results discussed. Diagrams, photograph. 8 ref. (S16)

249-S. Intensification of Radiographs. Emery Meschter. *Nondestructive Testing,* v. 13, July-Aug. 1955, p. 13-16.

Simple and rapid method produces significant increases in contrast and speed gains up to six-fold at the price of some increase in graininess. It is of particular value in intensifying radiographs made without fluorescent screens. Graph, table, radiographs. (S13)

250-S. A Test and Inspection Program in the Chemical Industry. Allan W. Gilbert. *Nondestructive Testing,* v. 13, July-Aug. 1955, p. 17-20.

Common flaws and detection methods, personnel training programs, maintenance records. Photographs, tables. (S13)

251-S. How Deep Is That Crack? Henry N. Staats. *Nondestructive Testing,* v. 13, July-Aug. 1955, p. 21-22.

Description and operation of eddy current test unit. Photographs. (S13)

252-S. Standardization in Ultrasonic Testing. C. W. Cline and J.

B. Morgan. *Nondestructive Testing,* v. 13, July-Aug. 1955, p. 23-27.

Description and use of standard reference blocks of various aluminum alloys. Graphs, diagrams, photographs. (S13, S22, Al)

253-S. Constant Potential Radiography of Steel at 2 Mev. Stanley S. Stacey. *Nondestructive Testing,* v. 13, July-Aug. 1955, p. 29-32.

Use of a 2.0 mev. constant potential electrostatic X-ray generator in radiography of heavy steel sections gives the radiographer a flexible, intense source of highly penetrative radiation which permits the use of simple, direct techniques free from the inconveniences caused by secondary radiation. Photographs, graphs, diagram. (S13, ST)

254-S. Nondestructive Testing on the Denver and Rio Grande Western Railroad. Clyde O. Penney. *Nondestructive Testing,* v. 13, July-Aug. 1955, p. 33-38.

Inspection procedures for railroad equipment, including fluorescent liquid, magnetic particle and ultrasonic methods. Photographs, micrographs. (S13, ST)

255-S. Automatic Gaging. A. Wiseman. *Steel Processing,* v. 41, Aug. 1955, p. 495-497.

Applications, incorporating into production, in-process and post-process gaging and gage signals. Diagrams. (S14)

256-S. Quality Control in Sheet and Plate Fabrication. Rowland Gardener. *Welding and Metal Fabrication,* v. 23, Aug. 1955, p. 295-298.

Survey of quality control concerning material selection, cleanliness, pattern development, cutting out, forming procedure, jig and fixture accuracy and welding processes and procedures. Photographs. (S12, K general)

257-S. Method of Determining the State of Carbon in Steel. Yu. A. Klyachko and M. M. Shapiro. *Henry Brutcher Translation No.* 3457, 11 p. (Condensed from *Zavodskaya Laboratoriya,* v. 14, no. 5, 1948, p. 549-553.) Henry Brutcher, Altadena, Calif.

Method of separating uncombined carbon from carbide in deposits obtained by anodic dissolution of steel samples, using a heavy liquid. Photograph, tables. 7 ref. (S11, ST)

258-S. Investigation of Sparking-Out Effect and the Influence of Third Elements in Spectroanalysis. I. L. N. Filimonov. *Henry Brutcher Translation No.* 3535, 20 p. (Condensed from *Zavodskaya Laboratoriya,* v. 15, no. 8, 1949, p. 919-936.) Henry Brutcher, Altadena, Calif.

Studies to determine whether sparking-out effect is caused by a change in the excitation conditions or by a real change in composition of the material which is vaporized into the spark. Connection between sparking-out, third element effect and effect of structure. Photographs, diagrams, tables, graphs. 25 ref. (S11)

259-S. Phase Analysis of Steel. II. An Answer to the Discussion on the Author's Paper. A. P. Gulyaev. *Henry Brutcher Translation No.* 3540, 9 p. (Abridged from *Zavodskaya Laboratoriya,* v. 12, nos. 7-8, 1946, p. 646-650.) Henry Brutcher, Altadena, Calif.

Determination of carbides, importance of selecting the right composition of the electrolyte used for anodic solution of the alloy, to match the composition of steel and carbide. Graph. 9 ref. (S11, ST)

260-S. Determination of Gases in Ferrous Metals. II. Apparatus and Microanalytical Procedure for the Determination of Hydrogen by the Vacuum-Heating Method. Yu. A. Klyachko and A. D. Atlasov. *Henry Brutcher Translation No.* 3548, 12 p. (Condensed from *Zavodskaya Laboratoriya,* v. 16, no. 3, 1950, p. 283-290.) Henry Brutcher, Altadena, Calif.

Advantages of vacuum heating over vacuum fusion for determination of gases, chiefly hydrogen, in iron alloys. Diagrams, tables, graph. 7 ref. (S11, Fe)

261-S. (Dutch.) **Tin as a Basic Material for the Tin-Processing Industry.** J. G. Nijkamp. *Metalen,* v. 10, no. 15, Aug. 15, 1955, p. 313-317.

Equipment and methods of testing thickness and mechanical properties of tin and tin plate. Photographs, graphs. (S14, Q general, Sn)

262-S. (French.) **Critical Study of an Apparatus for Measuring Threads.** J. Simonet. *Revue universelle des mines,* v. 11, ser. 9, no. 8, Aug. 1955, p. 381-399.

Description of apparatus, statistical examination of results of measurements. Photographs, diagrams, graphs, table. (S14)

263-S. (German.) **Photometric Determination of Columbium and Tantalum in Steel.** Alois Eder. *Archiv für das Eisenhüttenwesen,* v. 26, no. 8, Aug. 1955, p. 431-435.

Method, operating instructions, exactitude of determination. Table, graphs. 11 ref. (S11, Cb, Ta, ST)

264-S. (German.) **Determination of Silicon in Titanium and Titanium Alloys.** K. Jordan and R. W. Fischer. *Technische Mitteilungen Krupp,* v. 13, no. 2, May 1955, p. 39-43.

Specifications on a highly accurate photometric method of determining silicon in titanium and its alloys. Tables, graphs. 10 ref. (S11, Ti, Si)

265-S. (German.) **Rapid Photometric Analyses in the Plant.** Walter Nielsch. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 8, no. 8, Aug. 1955, p. 369-377.

Designs of Zeiss photometer and auxiliary equipment; specifications on the use of the equipment for analyzing alloys. Photographs, diagram, tables, graph. 70 ref. (S11)

266-S. Controlling Continuous Web Processes. Norman E. Walters. *Automation,* v. 2, Sept. 1955, p. 34-39.

Radiation gages for controlling thickness in production of metallic and nonmetallic sheet materials. Diagrams, photographs, graphs. (S14, F23, ST)

267-S. Testing Errors. G. H. Gardner. *Foundry Trade Journal,* v. 99, Aug. 4, 1955, p. 123-126.

Evaluation of errors to determine the extent to which they occur in routine analytical and physical tests. Tables, diagram. (S12, CI)

268-S. Radioisotopes in Industrial Research. S. E. Eaton. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/146, June 1955, 12 p.

When used in testing they are easy to detect, provide a small, inexpensive, portable source of radiation, can be measured in minute quantities with high sensitivity, and are specific so that they can be traced in the presence of chemically identical atoms. 19 ref. (S19)

269-S. Principles of Electronic Measurement and Control in Industry. H. J. Lindenhovius. *Microtecnic (English Ed.),* v. 9, no. 3, 1955, p. 155-161.

Indicates some of the more typical properties and advantages of electronic methods used in measurement and control. Table, diagrams, photographs. (S14)

270-S. What We Know About Cam and Tappet. *SAE Journal,* v. 63, Sept. 1955, p. 56-65.

Causes of tappet failure observed in engines and their relationship to tappet material. Photographs, micrographs. (S21, Q7, Q9, CI, ST)

271-S. Production Control of Quality Steels. R. W. Graham. *Steel,* v. 137, Aug. 22, 1955, p. 74, 76-77.

Effects of temperature and other processing variables on composition and quality. Graphs. (S general)

272-S. (German.) **Fatigue Fractures in High-Pressure Synthesizing Plants.** K. Daeves and K. F. Mewes. *VDI Zeitschrift,* v. 97, no. 21, July 21, 1955, p. 728-729.

Methods of locating areas of weakness and preventive measures. Diagrams. 1 ref. (S21, Q7)

273-S. (Russian.) **Theory of the Method of Measuring Thickness Using Radioactive Radiation.** A. M. Bogachev, B. I. Verkhovskii and A. N. Makarov. *Zavodskaia Laboratoriia,* v. 21, no. 7, July 1955, p. 808-812.

Determination of accuracy of the method; choice of radioactive isotopes. Graphs, table. 4 ref. (S14, S19)

274-S. (Russian.) **Method and Apparatus for Measuring Rolled Steel, Using Radioactive Radiation.** A. M. Bogachev, B. I. Verkhovskii and A. N. Makarov. *Zavodskaia Laboratoriia,* v. 21, no. 7, July 1955, p. 813-820.

Curves of absorption of beta and gamma radiation in steel. Circuit diagrams, graphs, photographs. 4 ref. (S14, ST)

275-S. (Pamphlet.) **Development of Nondestructive Tests for Structural Adhesive Bonds. Pt. III. Mechanical Impedance Technique.** PB 111678, 39 p. 1955. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.00.

Stainless steel and aluminum multi-ply laminates are subjected to vibrations developed by a ferro-electric transducer. Variations in voltage frequency curves occurring when the transducer was applied to satisfactory and defective test specimens are recorded and correlated with the strength of adhesive bonds as shown by later destructive tests performed on the same samples. (S13, K12, Al, SS)

T

Applications of Metals in Equipment

121-T. Metallurgical Problems of Modern Steam Turbines and Alternators. F. Buckley. *Engineering Journal,* v. 38, July 1955, p. 919-928.

Problems of the metallurgist in providing materials used in modern steam power plants. Photograph, diagrams. (T25)

122-T. Titanium Fasteners. John Van Hamersveld. *Machine Design,* v. 27, Aug. 1955, p. 169-170.

Results and conclusions obtained from extensive testing program of titanium alloy fasteners and parts to provide data for design evaluation. Photographs. (T7, Ti)

123-T. High Temperature Materials for High Speed Aircraft. II. Metals. *SAE Journal,* v. 63, Aug. 1955, p. 24-35.

Mechanical and physical properties of metals at varying temperatures up to 2400° F. Advantages and disadvantages of cermets and diffusion coatings. Graphs, diagrams, tables.
(T24, P general, Q general, H general, L15, SG-h)

124-T. GM Research Labs Develop New Turbine Bucket Alloy. D. K. Hanink, F. J. Webbere and A. L. Boegehold. *SAE Journal,* v. 63, Aug. 1955, p. 36-38.

Development of composition that combines high strength and low strategic alloy content, and detailed foundry procedures for the alloy. Table, graphs. (T25, E general)

125-T. (French.) **Utilization of Metals of the Platinum Family as Catalysts.** E. F. Rosenblatt, G. Cohn, F. E. Carter, B. Seligman, and L. C. Burman. *Revue de metallurgie,* v. 52, no. 7, July 1955, p. 529-536.

Applications in sulfuric acid manufacture, ammonia oxidation, gaseous reactions, hydrocarbon reforming, hydrogenation and halogenation. 10 ref. (T29, EG-c)

126-T. (French.) **Development of the Construction of Welded Spiral Housing for Reaction Turbines.** Pierre Piguet. *Zeitschrift für Schweisstechnik,* v. 45, no. 7, July 1955, p. 123-126.

Disadvantages of cast iron and cast steel housing for medium and low-pressure turbines. Combination of cast steel and steel sheet structural elements welded together make possible the elimination of the above disadvantages. Diagrams, photographs.
(T25, K general, CI, ST)

127-T. (German.) **Use of Light Metals for Construction of Hydroplanes.** E.-Fr. Gebauer. *Aluminium,* v. 31, nos. 7-8, July-Aug. 1955, p. 347-350.

Compares a hydroplane, which uses aluminum extensively, with other current designs. Table, graph, diagram, photographs. 3 ref.
(T22, Al)

128-T. Simplified Magnesium Air-Frame Design. J. P. Donald Garges. *Aeronautical Engineering Review,* v. 14, Aug. 1955, p. 36-43.

Use of thick-skin magnesium design techniques in the fabrication of swept and thin wings and other structural components results in reductions in weight, cost and engineering complexity. Diagrams, photographs, table, graphs. 5 ref.
(T24, Mg)

129-T. An Evaluation of Brass-Powder Structural Parts in Product Engineering. G. L. Werley. *American Society of Mechanical Engineers, Paper No.* 55—S-39, 1955, 6 p. + 4 plates.

Brief review of brass powder metallurgy. Examples, applications, advantages and properties of various parts. Photographs, diagrams, tables. (T, H general, Cu)

130-T. Tool Steels. II. Proper Selection Simplified. B. M. Hamilton. *Canadian Metals,* v. 18, Aug. 1955, p. 52, 54-55.

Water, oil and air hardening steels, and alloys for cold, hot and high-speed operations classified. Tables, photograph. (T6, TS)

131-T. High Permeability Steel Castings. Design and Manufacturing Techniques. J. F. Hinsley. *Edgar Allen News,* v. 34, Aug. 1955, p. 169-173.

Advantages of use of electrical steel castings for high magnetic permeability applications. Design of castings. Table, graphs, diagram, photographs. (T1, P16, E17, CI)

132-T. Manufacture of Cold Formed Structural Sections. *Engineer,* v. 200, Aug. 19, 1955, p. 263-264.

Process of manufacturing structural components for a braced portal structure. Photographs, diagrams. (T26, ST)

133-T. Alloys for the Chemical Process Industries. J. Z. Briggs. *Industrial and Engineering Chemistry,* v. 47, Aug. 1955, p. 1513-1516.

Properties and applications of four main types of alloys that have proved their value in the chemical industry. Graphs. 8 ref. (T29, Mo)

134-T. Today's Tooling Decisions Must Meet Tomorrow's Needs. C. J. Snyder. *Iron Age,* v. 176, Aug. 25, 1955, p. 195-200.

Plymouth's new V-8 engine plant, "bright-as-a-button" by current standards, is designed primarily for future demands. Innovations are detailed. Photographs. (T21, A5, G17)

135-T. Fabrication and Use of Titanium Fasteners. R. K. Smith. *Light Metal Age,* v. 13, Aug. 1955, p. 20-21, 29, 39.

List of ground rules established for design were influenced by test data acquired from sample fasteners. Graphs. (T7, Ti)

136-T. Future Aluminum Uses in Automobile Design. Leo Swoboda. *Light Metal Age,* v. 13, Aug. 1955, p. 24-25, 28.

Through the unique combination of properties, savings in dead weight, availability at a stable price, hybrid-type fabrication, and die casting outlook, use of aluminum in the automotive industry is increasing. Photographs. (T21, Al)

137-T. Better Performance From Metals. J. Harry Jackson. *Paper Mill News,* v. 78, Aug. 27, 1955, p. 72, 74, 76-78.

Problems of corrosion in paper-mill application and the need for good mechanical properties. Table, graphs, micrographs.
(T29, R general, Q general)

138-T. The Present Position of Aluminium in Shipbuilding. II. E. G. West. *Welding and Metal Fabrication,* v. 23, Aug. 1955, p. 299-304, 305-306.

Riveting, welding, types of material, painting and future applications in marine equipment. Photographs, diagrams, tables. 28 ref.
(T22, K1, K13, Al)

139-T. A Review of Ferrous Wire Qualities Appropriate to Chain Making. I. P. L. Lewis. *Wire Industry,* v. 22, Aug. 1955, p. 783-785.

Reviews omissions of the past and emphasizes to the wiremaker the importance to the chain trade of a steady supply of wire uniform in properties and treatment. Describes required analysis and metallographic behavior. Diagram, graph, micrographs, photograph.
(T7, F28, ST)

140-T. (Japanese.) **Selection of Steels for Hot-Formed Springs.** Shigeo Owaku. *Journal of Railway Engineering Research (Japan),* v. 12, no. 9, May 10, 1955, p. 222-224.

Selection of steels for hot formed springs from the standpoint of fatigue strength, shock resistance and heat treatability. Graphs, table.
(T7, AY)

141-T. Selecting Electrodes and Welding Rods. I. Mild and Low-Alloy Steels. Helmut Thielsch. *Machine Design,* v. 27, Sept. 1955, p. 187-193.

Specification of electrodes and their application to specific problems; effect of electrode coatings. Tables, photographs, radiograph. 6 ref. (T5, K1, AY)

142-T. Now Economically Feasible for Many Applications: Zirconium. *Magnesium,* 1955, Aug., p. 10-14.

Corrosion resistance, behavior in fabrication and applications. Photographs. (T general, R general, Zr)

143-T. Preview of Progress in the Use of Inco Nickel Alloy Helical Springs. I. *Mainspring,* v. 16, Aug. 1955, p. 3-9.

Compositions, mechanical properties, corrosion resistance; high-temperature properties. Graphs, tables.
(T7, Ni)

144-T. Aluminium Bronze Alloys. N. C. Ashton and C. V. Wilson. *Metal Industry,* v. 87, Aug. 19, 1955, p. 145-146, 149; Aug. 26, 1955, p. 165-168.

Development of aluminum bronzes for deep-drawing dies. Photographs, tables. 15 ref. (T5, Cu)

145-T. Aluminum vs. Copper Cable —The Case for Aluminum. Ray L. Townsend. *Welding Engineer,* v. 40, Sept. 1955, p. 21-23.

Sufficient conductivity, high heat-dissipating qualities and lightness coupled with decreased cost in comparison to copper definitely point the way for its expanded use. Photograph, tables. (T1, T5, Al, Cu)

146-T. (English.) **Steels Used in Moulds for Plastics.** *Aciers Fins & Spéciaux Francais,* 1955, no. 20, July, p. 32-34.

Problems involved in the selection of steels to be used in the manufacture of molds for plastics.
(T29, ST)

147-T. (English.) **Bi-Metal Strips.** *Aciers Fins & Spéciaux Francais,* 1955, no. 20, July, p. 68-71.

Definition and characteristics, use, applications and stability of these strips. Diagram, table.
(T1, T27, T5)

148-T. (German.) **Problems of Reactor Materials.** K. Lintner and E. Schmid. *Elektrotechnik und Maschinenbau,* v. 72, nos. 15-16, Aug. 1, 1955, p. 334-344.

Types and properties of materials used for fuels, moderators and coolants in atomic power plants and of structural materials for different power plant designs. Diagrams, tables, graphs. 22 ref. (T25)

149-T. (German.) **Silver as a Material Used in Electrical Engineering.** A. Keil and C. L. Meyer. *Schweizer Archiv für angewandte Wissenschaften Technik,* v. 21, no. 8, Aug. 1955, p. 264-270.

Contact breakers and other electrical parts of silver, silver alloys and silver-plated copper wire; condensers of metallized ceramic materials; hard silver solders for different soldering purposes; fuses of silver and silver-plated copper wire; resistors of silver-manganese and silver-palladium alloys. Tables, micrographs, graphs. 15 ref.
(T1, T5, Ag)

150-T. (Russian.) **Aluminum Alloys in Automotive Construction.** L. A. Egorov and A. I. Ermolaev. *Avtomobil'naia i traktornaia promyshlennost',* 1955, no. 7, July, p. 25-27.

Composition and properties of aluminum alloys used in different sections of automotive industry. Photographs, diagrams. 7 ref. (T21, Al)

151-T. (Book.) **Materials for Nuclear Power Reactors.** Henry H. Hausner and Stanley B. Roboff. Reinhold Pilot Book No. 7. 224 p. 1955. Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

Properties, problems, and applications of metals and other materials for structural components, fuels, coolants, and moderators.
(T25)

V

Materials

General Coverage of Specific Materials

224-V. How to Work Titanium and Its Alloys. Anderson Ashburn. *American Machinist,* v. 99, Aug. 15, 1955, p. 89-104.
Comprehensive summary of where titanium stands today in production and use, properties that can be expected, and current practice in heat treating, machining, forming, casting, welding, cleaning and finishing. Photographs, diagrams, graphs, tables. (Ti)

225-V. Cold Reduced, Low Carbon, Sheet Steel. N. G. Fraser and J. M. Butler. *Australasian Engineer,* 1955, June, p. 41-47.
Physical and chemical characteristics, modern practices in production and fabrication. Photographs, micrographs, tables. 3 ref. (Q general, E general, F general, CN)

226-V. On Austenitic Malleable Iron. II. Nobuhisa Tsutsumi. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 21-26.
Effects of copper, aluminum, or nickel alloying additions on properties and structure. Tables, diagrams. 3 ref. (P general, Q general, M general, CI)

227-V. Germanium. F. Szekely. *Institution of Electrical Engineers, Journal,* v. 1, July 1955, p. 454-457.
Properties and processes by which germanium is commercially extracted and fabricated for electronic applications. Diagrams, photographs. (C general, T1, Ge)

228-V. A New Titanium Alloy. R. J. McClintick, G. W. Bauer and L. S. Busch. *Materials & Methods,* v. 42, Aug. 1955, p. 90-92.
Available now as forgings, bar, plate and sheet, this aluminum-vanadium-titanium alloy has usable strength up to 1000° F., high tensile and impact strengths, good weldability. Photographs, graphs. (Ti)

229-V. These Hot Work Die Steels Look Promising for Aircraft Structures. Edward A. Loria. *Materials & Methods,* v. 42, Aug. 1955 p. 94-97.
Mechanical physical and fabrication properties of steels that may solve some high-temperature problems in high-speed aircraft. Tables, graphs. 6 ref. (T24, TS)

230-V. What's New in Aluminum Bronze? James S. Vanick. *Modern Castings and American Foundryman,* v. 28, Aug. 1955, p. 24-29.
Indicates modifications to composition 9D (i.e.; corrosion resistance, toughness and proportional limit), and applications for which they become desirable. Photographs, graphs, tables. 6 ref. (Cu)

231-V. (German.) **The Material of the Wrought Iron Age.** Ernst Hermann Schulz. *Archiv für das Eisenhüttenwesen,* v. 26, no. 7, July 1955, p. 365-371; disc., p. 371.
History of the characteristics, properties and compositions of wrought and malleable irons. Tables, graphs, micrograph. 9 ref. (CI, Fe)

232-V. (German.) **Low Melting Metals and Alloys.** H. Spengler. *Metall,* v. 9, nos. 15-16, Aug. 1955, p. 682-685.
Compositions, melting points, properties, uses. Table. 9 ref. (SG-d)

233-V. Aluminum 3003. Wrought Aluminum Alloy. *Alloy Digest,* no. Al-31, Sept. 1955.
Composition, physical constants, properties, heat treatment, machinability, weldability, workability, corrosion resistance, specification equivalents, general characteristics, forms available and applications. (Al)

234-V. Sil-Fos. Silver Brazing Alloy. *Alloy Digest,* no. Cu-30, Sept. 1955.
Composition, physical constants, properties, soldering characteristics, corrosion resistance, specification equivalents, general characteristics, forms available and applications. (Cu, SG-f)

235-V. Mueller 803. High Silicon Bronze. *Alloy Digest,* no. Cu-31, Sept. 1955.
Composition, physical constants, properties, machinability, workability, weldability, corrosion resistance, general characteristics, forms available and applications. (Cu)

236-V. Elektron ZW3. Magnesium Wrought Alloy. *Alloy Digest,* no. Mg-19, Sept. 1955.
Composition, physical constants, properties, machinability, workability, weldability, corrosion resistance, surface treatment, general characteristics, forms available and applications. (Mg)

237-V. AISI 4037. Molybdenum Alloy Steel. *Alloy Digest,* no. SA-33, Sept. 1955.
Composition, physical constants, properties, critical temperatures, heat treatment, machinability, workability, weldability, specification equivalents, general characteristics, forms available, applications. (AY)

238-V. Kanthal-D. Resistance Alloy. *Alloy Digest,* no. SS-34, Sept. 1955.
Composition, physical constants, properties, weldability, corrosion resistance, general characteristics, forms available, applications. (SG-q)

239-V. Duramold A. Air Hardening Hobbing Steel. *Alloy Digest,* no. TS-37, Sept. 1955.
Composition, properties, heat treatment, machinability, workability, weldability, corrosion resistance, general characteristics, forms available and applications. (TS)

240-V. UHB-46. Oil Hardening Tool Steel, Type O1. *Alloy Digest,* no. TS-38, Sept. 1955.
Composition, properties, heat treatment, machinability, workability, specification equivalents, general characteristics, forms available and applications. Graph. (TS)

241-V. British Cast Steels. J. Lomas. *Canadian Mining Journal,* v. 76, Aug. 1955, p. 54-57.
Types, properties and applications. Graphs, tables, photograph. (CI)

242-V. Arc-Cast Molybdenum. *Iron Age,* v. 176, Aug. 4, 1955, p. 79-81.
Larger sizes, higher density and lower gas content are major advantages. The four alloys of molybdenum with 0.3% columbium, 0.5% titanium, 1.0% vanadium, or 2.0% tungsten are evaluated by stress for rupture. Properties and applications. Graphs. (Mo)

243-V. Titanium—A Paradoxical Metal. Hugh W. Cooper. *Modern Metals,* v. 11, Aug. 1955, p. 46, 48.
Properties, applications and present status of development. (Ti)

244-V. (German.) **Titanium, Its Properties and Possible Uses.** O. Rüdiger, H. van Kann and W. Knorr. *Technische Mitteilungen Krupp,* v. 13, no. 2, May 1955, p. 23-38.
Summary review of the history, metallurgy, physical and chemical properties, working, welding, shaping and uses of titanium and its alloys. Tables, diagrams, graphs, micrographs, photographs. (Ti)

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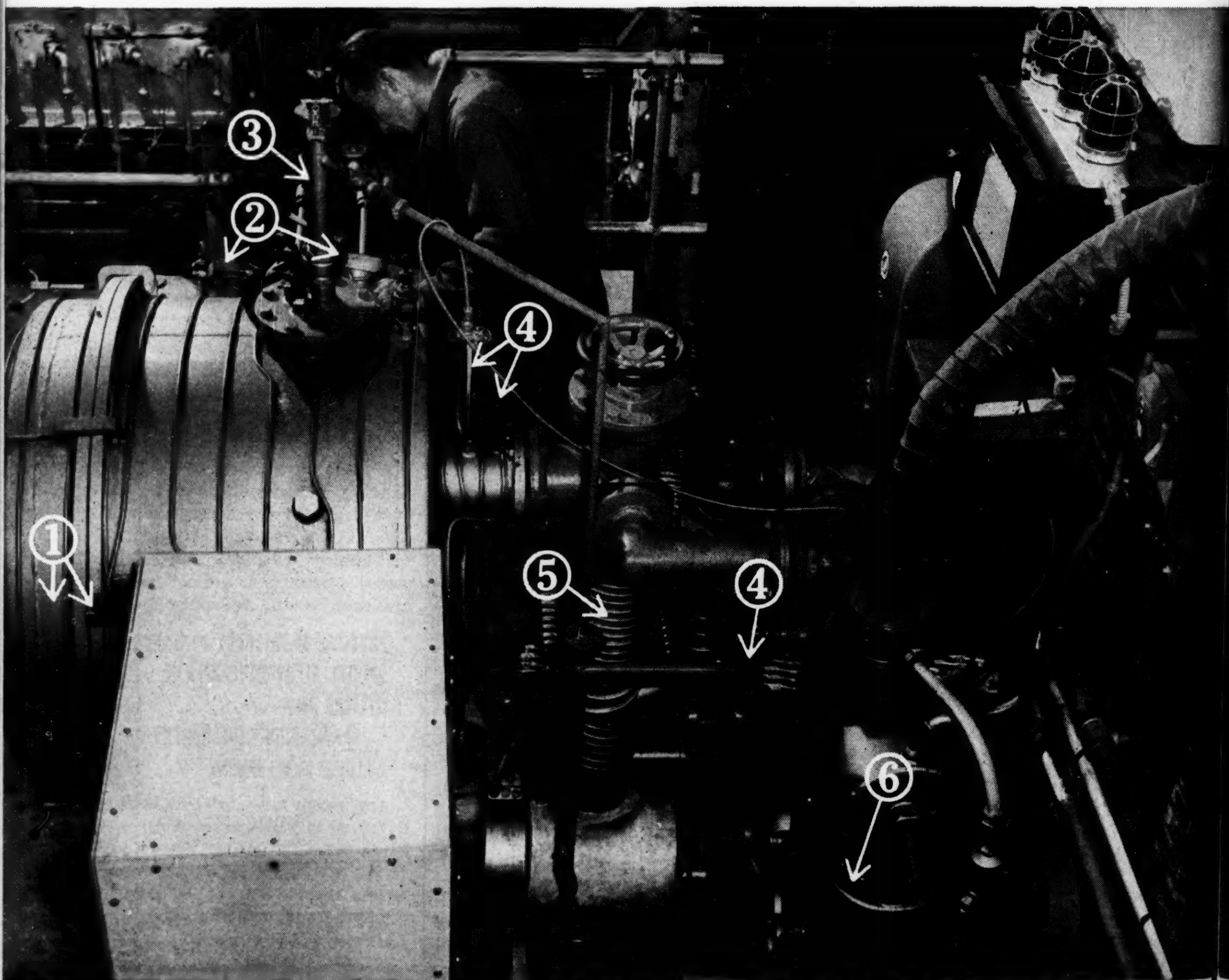

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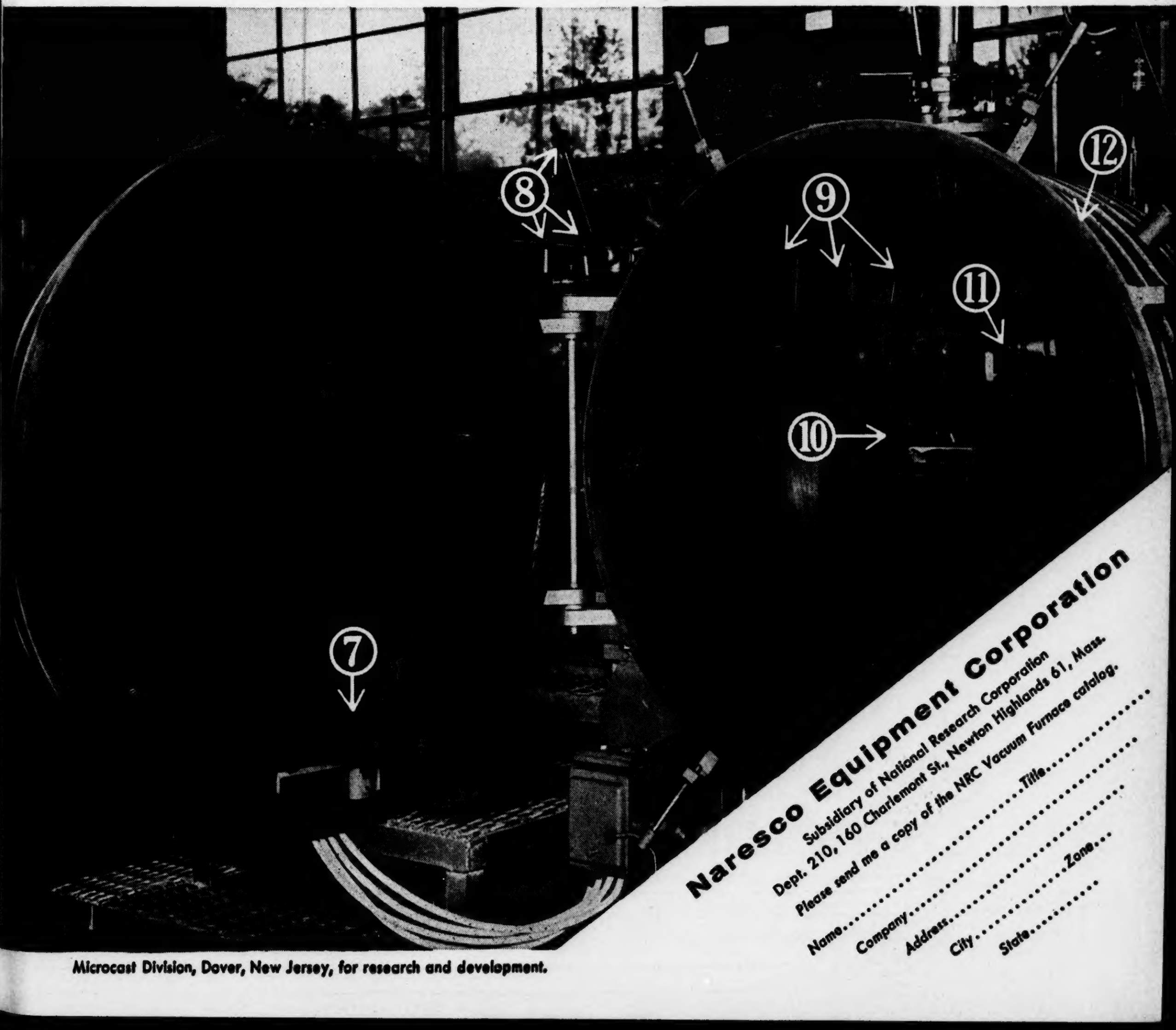

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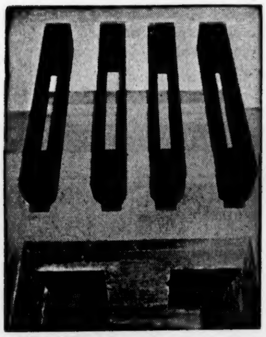

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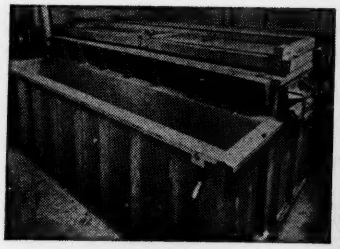
SPLIT ELECTRODES:

Split Electrode Assembly, as featured on the Type 701-4, is a part of U. S. Patent No. 2,701,269, which provides not only a forced action downward, but also force circulation unparalleled in any electro-magnetic field, with 100% clear working space.



Aluminum Heat Treating

ELECTRODE REPLACEMENT: (Guarantee)

In normal operation, you will find that our quotation for replacement electrodes is 20% LESS than electrode designs you are now using. If you use the complete design of Holden electrodes and cables, you will also have an additional saving, inasmuch as your work production for the individual furnace will increase approximately 15%.

Descaling—Descaling
18,000 lbs. per hr.—1800 KVA

THE A. F. HOLDEN COMPANY

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